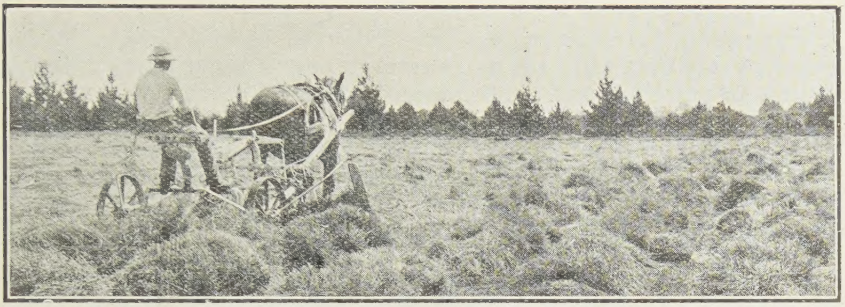

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THE GRASSLANDS OF NEW ZEALAND.

PRINCIPLES OF PASTURE-ESTABLISHMENT.

(Continued.)

E. BRUCE LEVY, Biological Laboratory, Wellington.

COASTAL SAND AREAS: 2. THE STABILIZED SANDS.

THE stabilized sand areas are usually irregularly disposed in hillocks and ridges with intervening level stretches, small or large, to which the name "sand-plain" has been applied (Fig. 90). Some type of vegetation of a more or less permanent nature is in occupation, and the location will determine very largely what plant predominates. Manuka, tauhinu, *Pomaderris*, mingimingi, *Dracophyllum*, and bracken-fern play an important part in natural plant-formations of the stabilized sands (Figs. 92 and 93). On older geological formations this vegetation may give place to trees of a more or less forest class, among which karaka, kohekohe, cabbage-trees, puriri, titoki, ngaio, akeake, and pohutukawa are characteristic. The latter, however, may also occupy coastal lands that have not been built up by wind-blown sand, and such do not come within the scope of this article. The soil in sand-country is essentially loose and friable, and contains more or less humus. The sand-plains often are quite damp and fertile, but the hillocks and ridges are extremely subject to

drying-out in the summer, and are likely to become broken by injudicious stocking, and to be converted into moving dunes through neglect to patch up any small breaks that might occur (Fig. 91).

UNPLOUGHABLE SCRUB-CLAD AREAS.

With regard to steep unploughable scrub-clad sand areas, the clearing and burning-off of these for grassing is bad practice, because there is exposed a shadeless surface on which to sow the seeds, and there is insufficient ash formed to afford a good cover. Consequently the conditions are extremely adverse to pasture-plant establishment. Mention of this fact was made in the article of this series dealing with steep scrub country (see *Journal* for March last). The difference that a little shade makes in the establishment of pasture-plants on these bare, dry slopes is very noticeable. Fig. 94 is a sown ploughed sand-area slope where fortunately all the *Pomaderris* scrub was not killed out in the ploughing. It will be noticed that paspalum is the main surviving plant of the mixture sown, and this grass has survived only under the shelter of the *Pomaderris* or in other scrub-sheltered positions. Quite sufficient paspalum is well established to finally make a complete sward, but it has established only in virtue of the shade afforded by the scrub-growth. The greater part of the North Auckland dune country is composed of quite open scrub land, and it would appear to be an act of folly to clear and burn this off. The writer is of the opinion that strong-growing pasture-plants like paspalum could be sown among the standing scrub with good prospects of success. If a little grass could be established thus at the offset some stock could be maintained on the area, and these by their treading and grazing would tend to break down the scrub and to distribute the seed of the paspalum, &c., in their dung. When sufficient grass was established the standing scrub might then be cleared off. This method is simply nature's replacement process, and its success would depend entirely upon the ability of the plant sown to establish and to compete with the scrub-growth. Paspalum is the only grass known to the writer that would be likely to succeed by this method.

PLOUGHABLE AREAS AND THE RAPE CROP.

Where the area can be ploughed, obviously this more direct method is the one to adopt; but the fact that ploughing is possible does not eliminate altogether the problems of pasture-establishment on these sandy soils. The soil is still loose in texture and very subject to drying-out on the approach of summer. In general, the sowings will be made in the spring, for on no consideration should these sand areas be worked during the summer, owing to the extreme likelihood of their surface being blown about by the wind. Spring sowing, then, should be general. This means a comparatively short period for establishment to take place before the dry weather of summer begins, and consequently only quick-establishing and strong-growing plants should be used in the initial sowing. The main objects of this sowing are (1) to get a rapid cover, and (2) to produce a crop which will carry a fair number of stock so that consolidation of the surface soil may be effected.

Of crops available to the farmer for this purpose rape stands pre-eminent. The heavier the rape crop the better will be the conditions made for subsequent grass-sowing, and therefore this crop should be

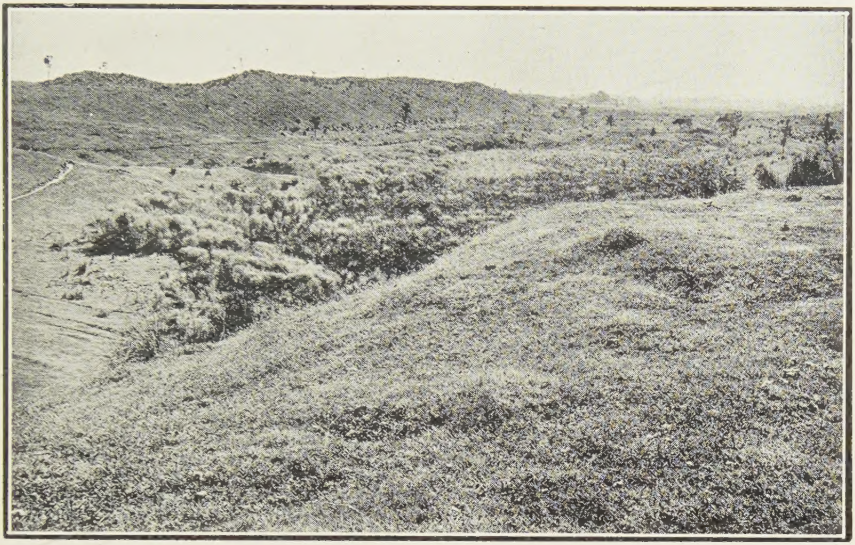


FIG. 90. STABILIZED SANDHILLS WITH INTERVENING SAND-PLAIN.

The pasture on the hills in the foreground is composed almost entirely of danthonia, New Zealand rice-grass, and Poa pratensis.

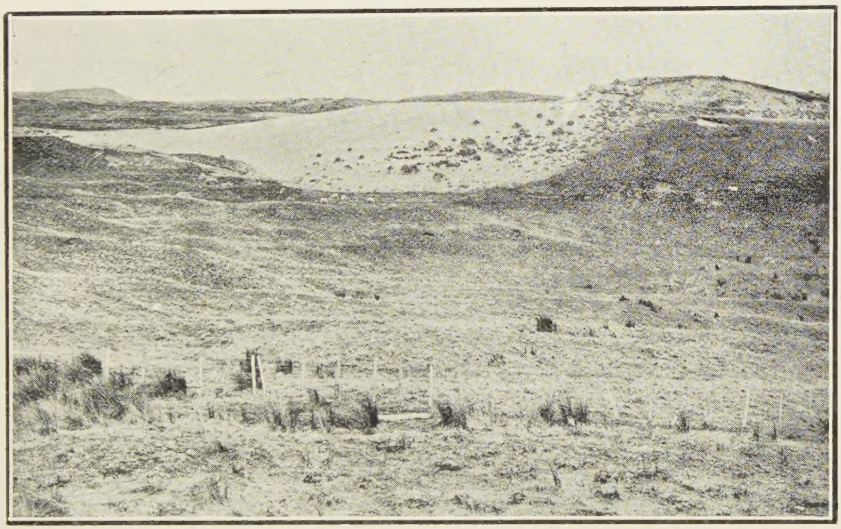


FIG. 91. THE COMMENCEMENT OF A SAND-DRIFT ON STABILIZED SAND-COUNTRY.

Neglect to patch up very small breaks, even on well-consolidated sand-country, may lead to the ruination of the area.

[*Photos by E Bruce Levy.*

FIG. 92. TAUHINU SCRUB ON SAND-COUNTRY.

An association not confined to sand-country, but common on pure sands. In general its presence in vegetation is indicative of a free open-textured soil.

FIG. 93. MANUKA-MINGIMINGI-DRACOPHYLLUM ASSOCIATION ON PLOUGHABLE SAND-COUNTRY, NORTH AUCKLAND EAST COAST.

The association is by no means dense, and may be walked through with ease.

[*Photos by E. Bruce Levy.*

heavily manured. This practice is adopted by many farmers, and the principle is essentially sound—namely, the employment of a quickly establishing plant that can make full use of the available spring rains, so that it may be firmly established to withstand the summer heat, and (perhaps even more important) so that a shelter is afforded the loose, dry surface which otherwise would be so easily shifted by the wind. The feeding-off of the rape by sheep is accompanied by consolidation and by an enriching of the surface by their droppings. A consolidated and enriched seed-bed is now secured for grass-establishment, and the permanent-pasture mixture should be surface-sown within the fed-down rape-stubble. If the surface has caked, as it will have done if rain has fallen during the feeding-off, a stroke or so of the disk or tine harrow will be necessary to secure a seed-bed; but if the surface is still loose and dry the seed may be sown and tramped in by the sheep, these being kept on the area for two or three days after the sowing. The rape preferably should not be fed too hard down, the idea being that the second growth of rape that will come away in the autumn will protect the young grass while it is establishing, and will afford a certain amount of shade and shelter. In this way the rape does really act as a preparatory and nurse-crop for the establishing grass (compare related matter on pp. 66 and 67 of *Journal* for August last). A great deal of the success of this method naturally depends on a good rape crop being produced. Many sand areas when spring-sown are extremely likely to run into sorrel, but a good rape crop will suppress this weed very largely, while a poor one will simply encourage its growth.

All stabilized sand-country does not dry out badly in the summer, and on such country the farmer is at liberty to establish his pastures on the ordinary lines, either spring or autumn sowings being quite likely to be successful. Practically speaking, however, the only sand areas that do not dry out in the summer are the level sand-plains. It may be put down fairly definitely that wherever hillocky or even slightly undulating country is being dealt with the rape-crop method of securing grass-establishment should apply. The sand-plains are essentially the pick of the sand-country soils, and quite good crops of rape or swedes can be produced on them as an initial breaking-in crop (Fig. 95). If rape is used, then autumn sowings of grass-seed will be adopted, but spring sowing will of necessity follow swedes.

SIGNIFICANCE OF GROWTH-FORMS OF NATURALLY INDUCED VEGETATION.

Before recommending any specific mixture for the grassing of these areas a consideration of those species of grasses and clovers which may be found more or less self-sown and in occupation of sandhills will be advantageous. Two very distinct types of plants are represented on these sandy areas. There is the perennial grass or herb which owes its ability to persist to its possession of a well-developed underground root-stock, by means of which it is able to tide over the crucial dry period of the year. This dry period is undoubtedly the factor which limits the number of species available for sand-pastures. Thus on old well-grassed sand areas the dominant perennial plants of the grassland are danthonia, New Zealand rice-grass, Poa pratensis, and Indian doob. Among the herbs may be mentioned sorrel, and among the most conspicuous weeds *Scirpus nodosus* and bracken-fern. All these plants have

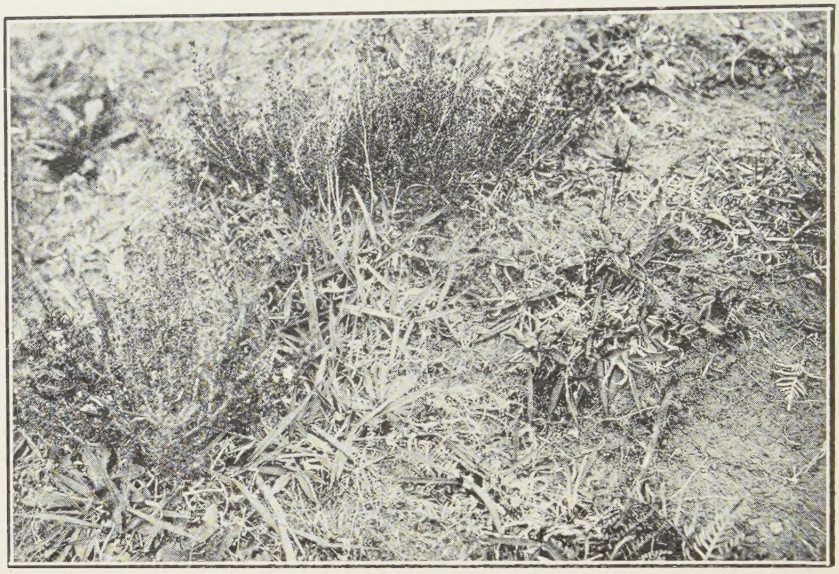


FIG. 94. PASPALUM ESTABLISHED ON SAND-COUNTRY THAT HAS BEEN PLOUGHED AND SOWN WITHOUT ANY NURSE-CROP.

The only places on this area where the paspalum successfully established were those in the shade and shelter of the *Pomaderris* scrub.

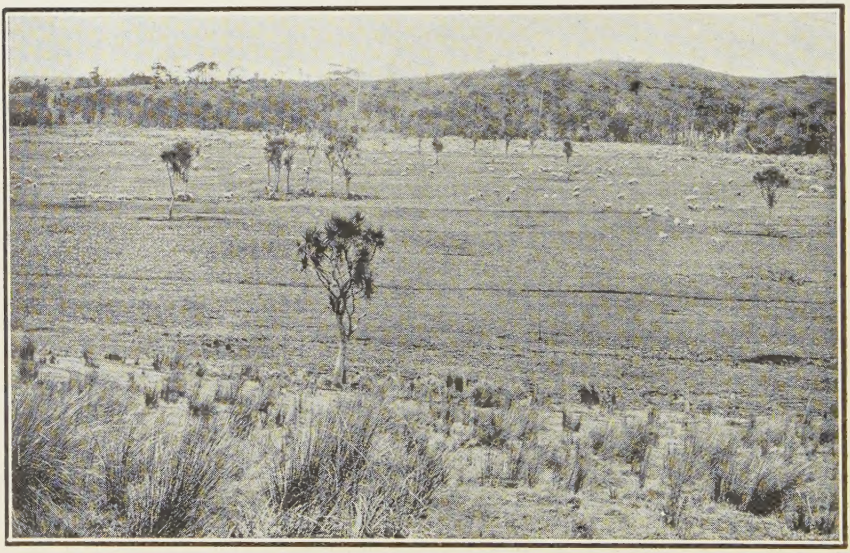


FIG. 95. A SAND-PLAIN CROPPED WITH SWEDES.

Here good results may be expected from sowing down the succeeding pasture in the ordinary way.

[*Photos by E. Bruce Levy.*

a decided underground rootstock, and their persistence and spread on sand areas is almost entirely due to this fact. The second type of plant that nature uses to cover these sandhills is the annual type. Perhaps one of the most characteristic features of the botany of sand-country is the large number of annual plants present in the vegetation. The following annual grasses are extremely common: Hair-grass, goose-grass, sterile brome-grass, barley-grass, English hair-grass, Billardier's bent-grass, quaking-grass, and harestail. Of the annual clovers, King Island melilot, spotted burr-clover, toothed burr-clover, hop trefoil, clustered clover, haresfoot trefoil, suckling-clover, and striated clover are common (Figs. 96 and 97). The weed vegetation similarly shows a preponderance of annuals. Each of the foregoing groups of plants is provided with special adaptations with which to tide over that crucial dry period to which sand soils are subject. In the case of the perennials it has been seen that such adaptation assumes the form of an underground rootstock, while with the annuals the free production of seed at the commencement of the dry period ensures a safe transit for their kind over the unfavourable period. This latter method of assuming a resting-stage to tide over crucial periods has widespread application in nature, particularly among the lowly organisms.

The persistence of annuals in our grasslands as a whole really tells more than the fact that there is a crucial period in the yearly cycle of the pasture. In general, the persistence of an annual flora indicates a more or less open association, due either to the absence of perennial plants or to the fact that what perennials are present are not thriving sufficiently well to form a dense sward. In first-class grassland where the ground is always covered by vigorous perennial plants annuals have no chance whatever, unless such perennial plants have a fairly long dormant period with little winter growth.

CRUCIAL PERIODS AND DEEP-ROOTING PLANTS.

Sand areas, then, afford a very decided indication, in the presence of the two groups of plants mentioned, that crucial periods occur, and this emphasizes the need of either a selection of those grasses and clovers that can withstand such a period, or the adoption of a method of farm-management that will allow others to persist under rather unfavourable conditions. Sand pastures are essentially winter-feed producers—provided paspalum is not used—and if it were possible to use them only for winter grazing a wider range of pasture-plants would be available to select from. Many perennial plants can persist through a crucial period provided they are not aggravated by close grazing and overstocking during that period.

Another growth-form in the naturally grassed sand areas is present to some extent, and is exemplified by such a grass as ratstail. A deep-rooting system makes it possible for this grass to tide over the crucial period, and it is through the exploitation by the farmer of such a growth-form that these sandhills can be made to produce their maximum of feed. The two outstanding plants with deep-rooting systems at our service are lucerne and paspalum.

It will be noted that sandy soils are extremely well adapted for clover-growth, no less than eight volunteer species being found quite commonly inhabiting sand areas. During the course of this investigation

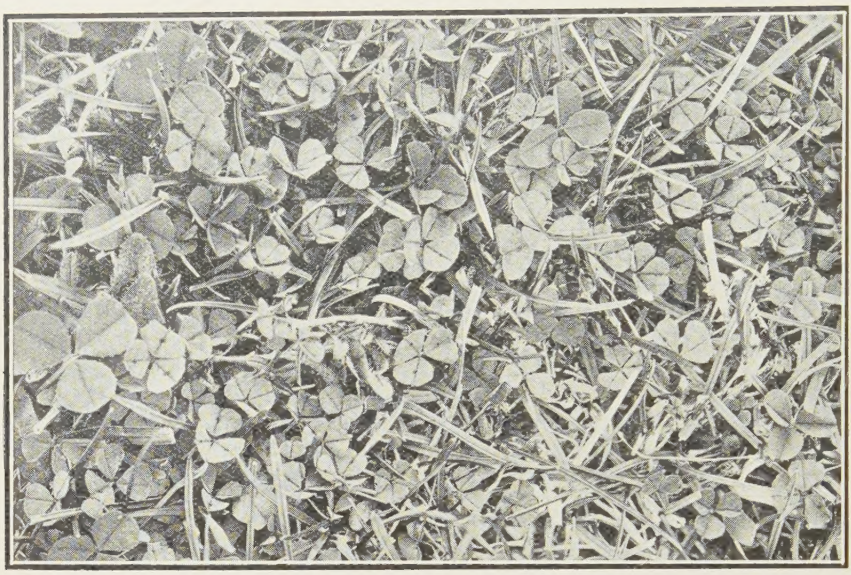


FIG. 96. ANNUAL CLOVERS IN SAND-PASTURE.

The main clover in the turf shown is spotted burr-clover, but English trefoil is also present. Photo taken in a good hollow.

[*Photo by W. D. Reid.*

FIG. 97. ANNUAL CLOVERS IN SAND-PASTURE.

Striated clover and haresfoot trefoil present in an association of danthonia (mainly) and sterile brome-grass on hill sand-country.

[*Photo by E. Bruce Levy.*

of the grasslands particular notice has been taken of the soils in which lucerne is likely to be successful with reasonable effort. The conclusion arrived at is that wherever such plants as English trefoil, King Island melilot, clustered clover, and haresfoot trefoil are growing naturally, there lucerne should flourish. A less reliable indication is spotted burr-clover. It will be noted that these indicators of lucerne lands are well represented in the sand areas, and the experience of farmers is confirming the fact that lucerne can be grown successfully on sandy soils (Fig. 98). Its deep-rooting system enables it to tide over the driest of summers. This also applies to paspalum, but the use of paspalum is limited by climatic conditions, and it is useful only in the range set out in the first part of this article (page 200 of the October *Journal*). Where the climate is sufficiently mild for paspalum to grow well there can be no doubt that it is easily the grass most fitted to occupy these sand areas.

THE ORDINARY TYPE OF PERMANENT PASTURE.

With regard to the formation of the ordinary type of permanent pasture on stabilized sand areas, the formation of a closed turf is important, for sand is so easily gouged out by the wind that any small bare space appearing is rapidly enlarged, and the plants consequently become more and more exposed. The necessity for permanent pasture right from the offset will therefore be obvious. It is quite hopeless, however, to attempt to get an immediate sward of Poa pratensis, danthonia, rice-grass, or one of paspalum, for all these are very slow to establish. It is my opinion that an attempt should be made on the better sand-country, at least, to improve somewhat on the possible danthonia, Poa pratensis, &c., sward, and there is no doubt that cocksfoot and crested dogstail should be used for this purpose. These two species, however, will not alone make a closed sward, and hence some Poa pratensis and danthonia should be included. A mixture somewhat as follows is recommended: Perennial rye-grass, 10 lb.; cocksfoot, 12 lb.; crested dogstail, 3 lb.; Poa pratensis, 2 lb.; Danthonia pilosa, 3 lb.; red clover, 2 lb.; white clover, 2 lb.; and English trefoil, 2 lb.: total, 36 lb. per acre.

Where the aim is a paspalum pasture 4 lb. of paspalum should be included, and the Poa pratensis and danthonia omitted. On the wetter sand-plains a little more rye-grass could be added, the Poa pratensis and danthonia omitted, and about ½ lb. of Lotus major and 2 lb. of timothy included. On the steeper sand-country it is very doubtful whether a cocksfoot, crested dogstail, and Poa pratensis sward could be maintained. The fate of all hill sand-country, particularly under constant stocking, at most will be a danthonia, Poa pratensis, rice-grass, and annual-clovers sward. Inclusion of the cocksfoot and crested dogstail, however, will mean that the transition to this sward will be much slower than if rye-grass alone were used as the transitional species. Again, rye-grass goes out too quickly, so that bare ground appears before the danthonia and Poa pratensis, &c., have become well established. Wind-breaks are thus likely to occur, and a sand-drift may result, which may lead to the ruination of the area. If paspalum is being established the same holds true, for on sand-country this grass is slow to establish. In many districts Waipu brown-top may well be substituted for danthonia, but this grass will not persist in quite such

FIG. 98. A SUCCESSFUL STAND OF LUCERNE ON STABILIZED SANDS.

The deep-rooting system of lucerne, once the plant is established, enables it to tide over the dry period often experienced on sand areas. Photo taken on the property of Mr. Prendergast, near Helensville.

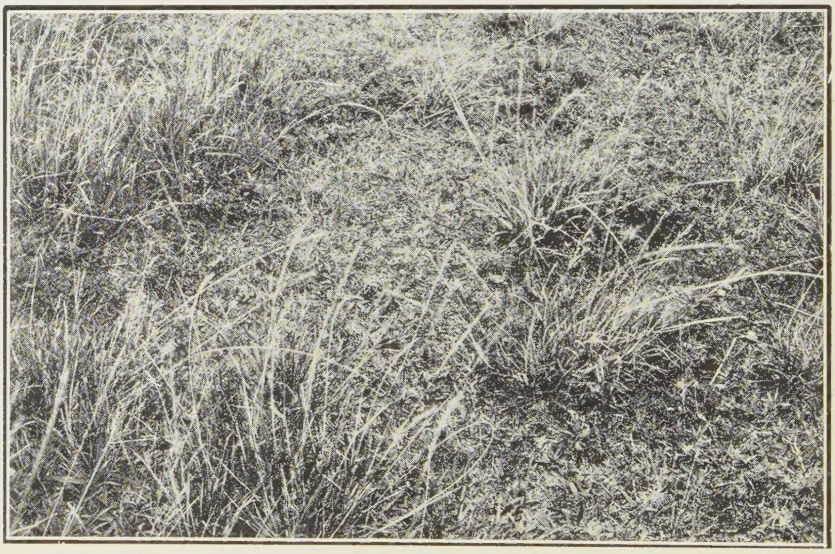


FIG. 99. RATSTAIL AND PASPALUM ON SAND, NORTH AUCKLAND.

The pasture has been closely grazed with sheep. Note how the ratstail has been neglected and the paspalum cropped close down.

[*Photos by E. Bruce Levy.*

poor sands as danthonia. From the foregoing it will be obvious that the writer is of the opinion that if a farmer has sand-country already in danthonia, Poa pratensis, rice-grass, &c. (Fig. 90), no attempt should be made to improve it by ploughing up and resowing in the hope of establishing the better English grasses. New Zealand rice-grass has not been included in the mixture specified, as seed is not available. Ratstail might also be included, but, compared with paspalum, ratstail is a poor grass and requires much more stock-management to enable advantage to be taken of the herbage produced (Fig. 99).

THE QUESTION OF ANNUAL CLOVERS.

The question whether annual clovers should be added to mixtures for this type of country needs some careful consideration. Certain of them undoubtedly will come in, but the sward of permanent grass produced will regulate the amount of annuals that persist. There is no doubt that the annual clover is of very great value in our grasslands, and although the feed produced is spasmodic, yet it must be remembered that the growing-period of a permanent clover like white clover in places where dry spells are experienced is of only short duration, corresponding, in fact, almost exactly with such an annual clover as suckling-clover or haresfoot trefoil. The nitrifying effect on the soil of annual clovers is another important point. There is one danger with annual clovers on sand-country which should be guarded against, and this lies in the fact that given a wet spring and wet early summer the growth of annual clovers is so prolific that permanent grasses like danthonia, which cannot endure a cover, may be quite overtopped and smothered out. Then when dry weather finally arrives the annual rapidly dries off, leaving the ground bared of vegetation. Many farmers on good volcanic lands have had this same experience with spotted burr-clover, and even with such a useful species as subterranean clover. Despite this danger the annual clovers are by no means to be despised, but it seems advisable to allow them to come in naturally or to sow them after the permanent grasses are established. In this way the danger of getting too rapid a flush of growth at the offset will be avoided.

Trainees at Ruakura.—During the last official year 101 returned soldier trainees passed through the Ruakura Farm of Instruction. The number of learners (youths) was fifteen. Lady trainees numbered ten, these specializing in apiary, poultry, and horticultural work, and including several returned army nurses. There were also some half-dozen other civilian trainees.

Grazing in State-forest Lands.—The last annual report of the State Forest Service states that a comprehensive investigation and study of the grazing-values of State-forest lands was completed during the year by the soil and grazing specialist of the Service, and as a result of the conclusions arrived at a grazing policy and method of control are now being finalized. While grazing uses of State forests must always be subordinated to the major activity of producing timber crops, nevertheless the proper use of stock in certain State-forest regions is of benefit silviculturally in checking the growth of inflammable undergrowth and in the reduction of the fire hazard. In drawing up grazing regulations care is being exercised to see that all grazing is accounted for, and the number of stock maintained as is commensurate with sound silvicultural practice. The State-forest lands are now undergoing classification for grazing assessment of long- and short-term leases and permits.

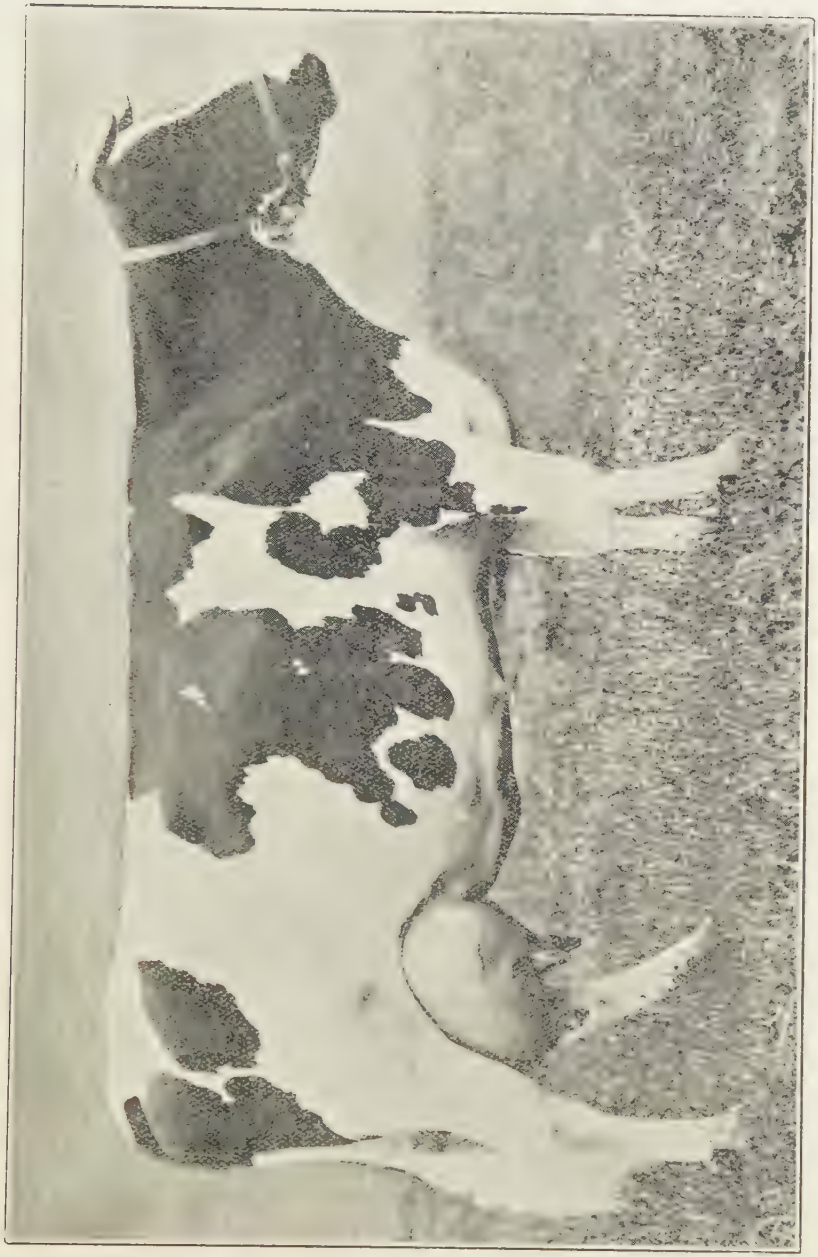
NEW CHAMPION MILK AND BUTTERFAT RECORD FOR NEW ZEALAND.

ALCARTRA CLOTHILDE PIETJE AND HER PERFORMANCE

W. M. SINGLETON, Director of the Dairy Division.

For many years it has been the keen desire of New Zealand breeders to attain a 1,000 lb. butterfat cow, and it is pleasing to record that this much coveted ideal has now been well realized. The Friesian cow Alcartra Clothilde Pietje, owned by Mr. Vernon Marx, of Mangatoki, Taranaki, calved with twin heifers on 31st October, thereby qualifying for certificate with the splendid production of 31,312·5 lb. of milk, containing 1,145·24 lb. of butterfat. This places her as leader of the mature class of Friesians, and champion milk and butterfat producer of New Zealand. Alcartra, who commenced her test at the age of 7 years 355 days, displaces Messrs. North and Sons' fine old cow Burkeyje Sylvia Posch, who since October, 1919, has held the championship with the high production of 26,226 lb. milk and 983·20 lb. butterfat. It will thus be seen that the margin between the two champions is no less than 5,086·5 lb. milk and 162·04 lb. fat. Alcartra Clothilde Pietje was on test during the season 1919–20, when she produced (from three quarters only) 842·71 lb. fat from 23,011 lb. milk in 365 days, calving some six weeks after finishing her year.

Alcartra Clothilde Pietje is a champion carrying the blood of champions in her veins. She is descended from American Friesians of the highest quality, and from strains imported by Mr. Newton King, of Taranaki. Her pedigree affords an interesting study in breeding, a most noticeable feature being the fact that proven individuals have been mated as closely as discretion will permit. Tracing to the fourth generation back, we find the name of Sir de Kol Inka Pietertje appearing twice. He is sire of fifteen C.O.R. daughters, and his name is sufficiently well known to students of the Friesian breed to need no annotation here. One generation nearer, we find that both male ancestors appearing in that generation are one and the same—namely, King Alcartra Pietje, who is sire of three C.O.R. daughters, one of whom has produced over 600 lb. and another over 500 lb. of butterfat. A son of King Alcartra Pietje—King Alcartra Rose de Kol—was then mated with a daughter of King Alcartra Pietje—Clothilde's Alcartra—and from this mating sprung our champion. Beside Alcartra Clothilde Pietje, King Alcartra Rose de Kol has sired three certificated daughters whose records were considered creditable at the time they were made, and the dam, Clothilde's Alcartra, has one certificate for 469·44 lb. fat as a senior three-year-old, and another for 605·45 lb. as a mature cow. Here and there a name in the pedigree holds the eye. Four generations back is Rozine III de Kol, dam of three daughters which have gained their certificates of record in New Zealand; and Pietje XXII, Hengerveld de Kol, and Alcartra Polkdadot are names which stand out among the makes of the breed in America.



ALCARIRA CLOTHILDE PIETJE.

That our Friesian breeders who imported from the United States the stock from which Alcartra Clothilde Pietje sprung selected wisely is quite apparent from the foregoing remarks. New Zealand now has many Friesians of the special-purpose dairy type and high production, as a review of the records appearing from month to month amply testifies. That in breeding for production constitution has not been sacrificed in Alcartra Clothilde Pietje is evident from a glimpse at the accompanying photograph, robustness and capacity being distinctly revealed.

We understand that Alcartra Clothilde Pietje had no forced feeding while on test, though naturally she had a plentiful supply of supplementary food; the bulk of this, however, was what may be described as farm-produced foods. Doubtless the excellent pasture on which she was running went a long way toward allowing her hereditary quality every opportunity, and must also have done much toward retaining her fine constitution unimpaired. That she has been well handled all round there is no doubt, and Mr. Marx is to be heartily congratulated on the achievement.

When it is considered that Alcartra Clothilde Pietje calved nine days within the year prior to commencement of test, that she carried twins and calved sixteen days after completing her 365 days on test, that she received no forced feeding, and that she was not at any period of the test milked more than three times a day, it is doubtful whether her performance cannot be considered a world's record. The twins were sired by Coldstream Pontiac Paul, a bull of particularly strong butterfat-record backing, and we shall look forward with interest to the day when these heifers will be on test.

INTRODUCTION OF PLANTS, FRUITS, ETC., INTO BRITAIN.

The conditions under which plants, fruit, &c., may be imported into England and Wales, as defined in regulations entitled the Destructive Insects and Pests Order of 1921, have been amended in a superseding Order of 1922, which took effect as from 1st July. A like Order made the amended regulations operative in Scotland as from 1st August, and it is understood that the Ministry of Agriculture for Northern Ireland is taking similar action. The text of the 1921 regulations was printed in full in the *Journal* for January last, and only the principal amendments embodied in the new Order are now given, as follows: (*a.*) The certificate of health accompanying the plants from their country of origin must be issued not more than fourteen days prior to shipment, instead of thirty days as before. (*b.*) Corky or powdery scab of potatoes (*Spongospora subterranea* Lagehr.) has been added to the list of pests from which plants must be free, while potato-blackleg (*Bacillus atrosepticus* Van. Hall) has been removed. (*c.*) In place of the requirement that each package shall bear a label and a copy certificate, in future there will be required only two copy certificates for each consignment, one of which must be produced to the Customs officer at the port of entry, and the other go to the consignee. In the case of packages imported through the post no copy is required for the Customs, but one must be affixed to the package. The original certificate should be forwarded to the Ministry of Agriculture as before. (*d.*) As regards potatoes, no exception is now made in the case of new potatoes. Exporters from New Zealand requiring certificates should apply to the Horticulture Division of the Department of Agriculture.

LEAF-RUST, PUCCINIA PRUNI-SPINOSAE PERS.*

ITS APPEARANCE, CAUSE, AND CONTROL.

G. H. CUNNINGHAM, Biological Laboratory, Wellington.

LEAF-RUST is a fungous disease common in New Zealand wherever stone-fruit trees are grown. It occurs also in Australia, North and South America, Europe, South Africa, and Japan. The disease appears year after year in the same orchards, and first becomes noticeable on the leaves towards the end of December; it is more severe in wet seasons. The rust is common on the leaves of nectarines, peaches, and plums, less so on almonds and apricots, and rare (in New Zealand) on cherries.

The æcidial stage of the causative organism occurs on *Anemone*, *Hepatica*, and *Thalictrum*, but in New Zealand it has been found only on the cultivated anemone (Fig. 1).

EFFECT ON THE HOST.

Leaf-infection may be followed by premature leaf-fall, defoliation, or even death of the tree, according to the severity of infection and the length of time infection may persist—*i.e.*, whether for one or for several seasons. Where partial defoliation has occurred, the tree becomes weakened and is incapable of carrying a full crop the following season, owing to the fact that the nutrition of the tree is dependent upon the leaves. Where infection persists over a period of several seasons the trees become debilitated, and consequently more susceptible to the attacks of other fungi, such as silver-blight or brown-rot. Defoliation before the fruit has matured is followed either by the dropping of the fruit, or else by the fruit remaining small and becoming badly disfigured with rust-marks and cracks. On young nursery-stock severe infection and consequent defoliation have resulted in the death of the trees.

Peach and nectarine fruits are sometimes infected, the fruit being frequently rendered unsaleable on account of the disfigurement arising from spots and cracks caused by the fungus (Fig. 4); moreover, fruits so infected are more liable to rot, the cracks offering greater facility for fungous attack. Shoot-infection is followed by the formation of small blisters on the laterals: where infection is severe the laterals may be killed outright.

ECONOMIC IMPORTANCE.

From the foregoing it is seen that leaf-rust is a serious disease, and may cause total loss of the current season's crop as well as a light crop the following season. Where infection is severe and prolonged over two or three seasons, death of the tree sometimes follows. Infected trees inevitably become an easier prey to other fungi. Leaf-rust is

* Synonyms: *Aecidium punctatum* Pers.; *Puccinia Pruni* DC.; *Tranzschelia punctata* Arth. Almond-rust; apricot-rust; peach-rust; plum-rust; prune-rust; rust.

FIG. 1 (LEFT). ÆCIDIA ON THE UNDER-SURFACE OF ANEMONE-LEAF.
Note the broad expanded margins of the peridia. × 2.

FIG. 2 (RIGHT). UREDOSORI ON UNDER-SURFACE OF NECTARINE-LEAF.
The uredosori may be seen as minute spots in the centres of the white areas, which have been killed by the mycelium of the fungus. × 2.

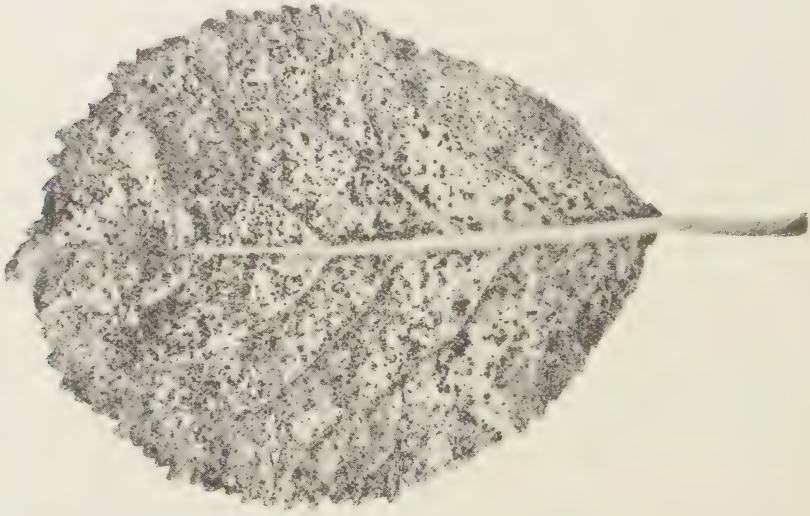


FIG. 3. TELEUTOSORI ON UNDER-SURFACE OF PLUM-LEAF. NATURAL SIZE.

[*Photos by E. Bruce Levy.*

not considered serious by the majority of orchardists, owing to the fact that fruits are thought not to be attacked by the rust. In the orchard sufficient attention is not paid to the disease. This is true also of many other diseases which do not ruin the crop but tend to weaken the tree.

APPEARANCE IN THE FIELD.

As indicated, leaf-rust infects leaves, fruits, and young shoots. On the under-surface of the leaves it forms small bright-yellow areas, which sharply contrast with the dark green of the leaf and are visible on the upper surface as discoloured, irregularly shaped spots. In the centre of these yellow areas the uredospores appear as rusty-brown masses (Fig. 2). Finally the leaves turn yellow and fall, from the base of the shoot progressively upwards, till nothing remains but the young developing leaves at the apex of the shoot.

On the fruits small circular depressed spots are formed. These become conspicuous as the fruits reach maturity, through the appearance of a reddish border, in which may be seen the uredospore masses or uredosori (Fig. 4). If a transverse section is cut through the spot, immediately beneath the surface and extending into the fruit $\frac{1}{4}$ in. to $\frac{1}{2}$ in. will be seen a compact area somewhat more firm and brighter in colour than the cells of the fruit. This is formed of closely woven masses of hyphæ, which collectively constitute the mycelium or vegetative portion of the fungus (Fig. 5). The presence of these hyphal masses serves to distinguish fruit-spots caused by this organism from those caused by other fungi. These spots are somewhat common on the fruits of peaches and nectarines, and sometimes appear on the soft outer shell of almonds, but apparently do not occur on the fruits of plums or cherries.

On the shoots of certain varieties of peaches this rust forms small cankered areas, the bark splitting longitudinally, the crevices between being occupied by the uredosori (Fig. 6).

LIFE-HISTORY OF THE CAUSATIVE ORGANISM.

Leaf-rust is caused by a parasitic fungus belonging to a group popularly termed rusts. The species in question has three spore-forms in its life-cycle—namely, æcidiospores, uredospores, and teleutospores; moreover, it is heterœcious—*i.e.*, its æcidia occur on *Anemone*, &c., and its uredospores and teleutospores on *Prunus* spp.

From November onwards small yellowish æcidia—small cup-shaped bodies or peridia (Fig. 7, *p*) filled with spores in chains (Fig. 7, *ch*)—make their appearance on certain cultivated species of *Anemone* (Fig. 1). The æcidia are scattered evenly over the leaves, and are readily distinguished by the broad, white, expanded margins of the peridia (Fig. 7, *p*) and the dingy-brown spores. The mycelium is perennial in the tissues of the *Anemone*, and continues to produce æcidia season after season until the host is killed. Infected leaves and stems are distorted and somewhat paler in colour than normally. The attacked plants are of little use to the gardener who cultivates them, as they seldom flower. In fact, so disastrous is this rust on cultivated anemones that it is frequently necessary to grow fresh plants from seed every second year or so.

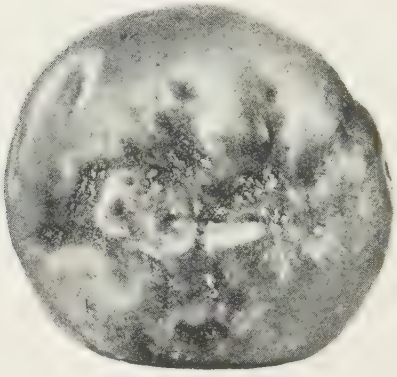


FIG. 4. DEPRESSED SPOTS FORMED ON THE SURFACE OF FRUIT OF NECTARINE.
The white spots are uredosori. Note distortion and cracking. Natural size.

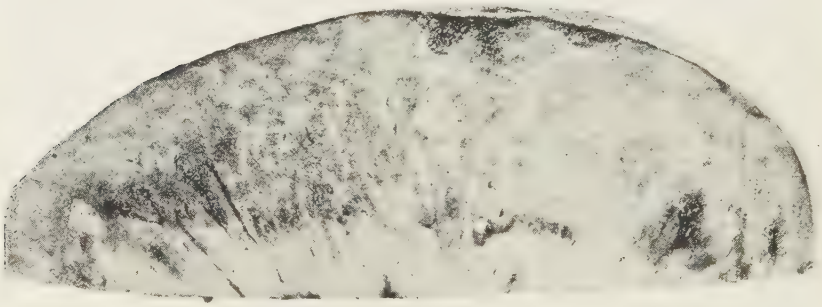


FIG. 5. SECTION THROUGH LEAF-RUST SPOTS ON FRUIT (PEACH).
The darker areas are compacted mycelial masses of the uredosori. × 2.

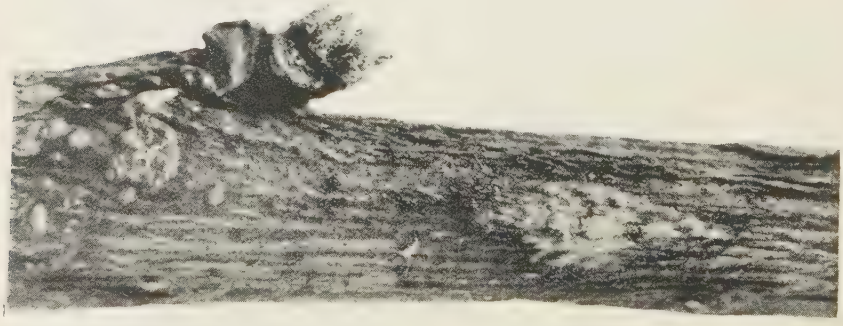


FIG. 6. PUSTULES OF UREDOSORI ON PEACH-LATERAL, VARIETY SNEED. × 5.

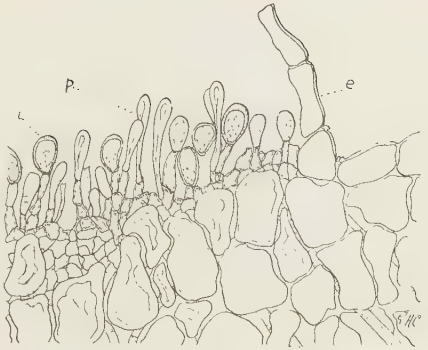
[Photos by E. Bruce Levy

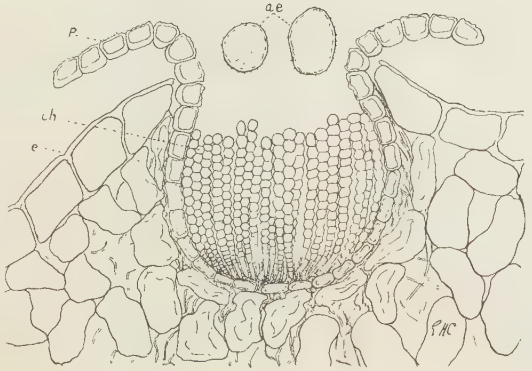
Aecidiospores are capable of producing æcidia on other plants of the same species of *Anemone*, or, should one alight on the leaf of a plum, peach, or other stone-fruit tree, it may germinate and produce a germ-tube, which penetrates the epidermis and enters the host tissues. Here it branches repeatedly, forming a mycelium, the hyphæ of which ramify between the cells of the leaf and, sending small branches (haustoria) into the cells, absorb portion of the contents. The cells thus parasitized finally die, masses of these dead cells forming the minute yellow spots so noticeable on the leaves (Fig. 2).

From the mycelium lying beneath the epidermis upright hyphæ are given off, at the apices of which spores are produced. As the spores develop they force the epidermis upwards, forming a small blister, which soon ruptures and exposes the uredospores (Fig. 8, *u*). Uredospores first appear in December, and thereafter during the summer and autumn months are produced in enormous numbers. Each uredospore is capable of infecting the leaves of any other stone-fruit tree in the vicinity, but cannot infect *Anemone*. Uredospores are readily carried by wind or other agency (insects probably play a part in their distribution) to other trees in the vicinity, and, being covered with minute spines (Fig. 9, *a*), they effectively cling to any surface on which they may alight. It is well to stress the fact that uredospores produced on plum-trees may infect peaches, apricots, &c., and *vice versa*, as it will presently be shown how knowledge of this fact may assist in combating the disease. In the warmer parts of New Zealand uredospores are produced on the leaves of peaches until the middle of June.

Later in the season, from the uredosori or from teleutosori arising from uredospore-infection (Fig. 3), a third kind of spore, the teleutospore, is produced (Fig. 9, *b*). Teleutospores are thick-walled, and are covered with a thin chitinous cuticle. They are thus able to withstand extremes of cold until the following spring, when they may germinate and produce short basidia (Fig. 9, *ba*), on which four basidiospores are borne (Fig. 9, *sp*). These are capable of infecting *Anemone*—on which they produce æcidia—but they are unable to infect stone-fruit trees. Teleutospores are commonly produced on plum-leaves (Fig. 3), but in New Zealand they are comparatively rare on other hosts. The teleutospores are dark chestnut in colour when looked at in the mass. Under the low power of the microscope the spores are seen to be aggregated in small spore-balls ; higher magnification shows this to be due to the pedicels of a number becoming agglutinated together (Fig. 9, *c*).

In order that the life-cycle may be completed the presence of both *Anemone* and *Prunus* is essential, teleutospores apparently becoming functionless in the absence of *Anemone*, as they can infect only this host. Since leaf-rust is widespread in New Zealand, while anemones are much more restricted in their distribution, it would appear that the latter play but a minor part in the perpetuation of the rust, and that the fungus is carried over the winter chiefly by means of uredospores. This probability is strengthened by the knowledge that the uredospores are capable under favourable conditions of remaining viable for several months—*i.e.*, they will still be alive when the new foliage appears. As most of the infected leaves are deeply buried when the orchards are ploughed it would further appear that infection is due to spores carried over in the crevices of the bark and bud-scales.





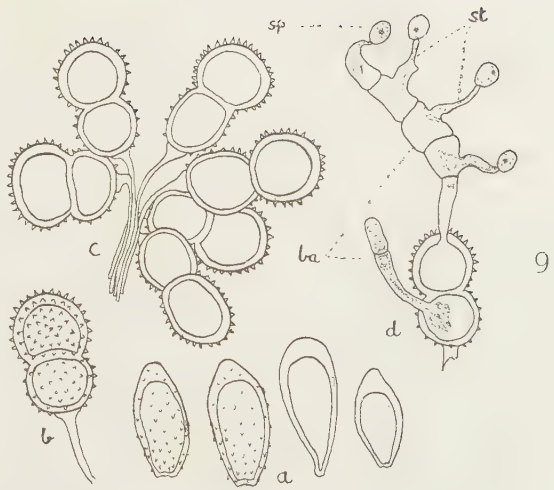


FIG. 7. SECTION OF ÆCIDIUM ON ANEMONE-LEAF. × 110.

(*Ae*) Ædiospores (× 650); (*ch*) chains of ædiospores; (*e*) hypodermis; (*p*) wall of peridium. Camera lucida drawing. Original.

FIG. 8. SECTION THROUGH UREDOSORUS ON PEACH-LEAF. × 400.

(*e*) Hypodermis; (*p*) paraphyses; (*u*) uredospores. Camera lucida drawing. Original.

FIG. 9. UREDOSPORES, TELEUTOSPORES, AND GERMINATING TELEUTOSPORE. 500.

(*a*) Uredospores; (*b*) teleutospore with pedicel; (*c*) group of teleutospores held together by their pedicels; (*d*) germinating teleutospore; (*ba*) basidia; (*sp*) basidiospore; (*st*) sterigmata. Camera lucida drawings. Original.

It would thus seem that the uredospore stage is the chief source of infection each season; anemones are so local in their distribution that as a source of infection they may be regarded as negligible. Control measures, therefore, must be directed towards the destruction of viable uredospores, and the prevention of leaf-infection by keeping the developing leaves well covered with a protective spray. As uredospores from plum-trees may infect other stone-fruits, it is necessary that the following spray treatment be applied to plum-trees as well as to the more valuable peaches and nectarines. Too often in orchard practice are the plums overlooked during spraying operations.

CONTROL.

(*By J. A. Campbell, Director of the Horticulture Division.*)

In autumn, when the leaves have fallen, plough deeply, and dig beneath the trees, turning over all soil not reached by the plough, thus burying the majority of the infected leaves. Spray according to the following schedule:—

No.	Time of Application.	Spray.
1	When buds begin to swell ..	5–4–50 bordeaux or 1–15 lime-sulphur.
2	One month after petal-fall ..	1–120 lime-sulphur.
3	When fruits are half-grown ..	1–120 lime-sulphur.
4	Shortly before fruits reach maturity	1–120 lime-sulphur.
5*	Shortly after fruit has been picked	1–120 lime-sulphur.

* One or more applications are necessary at this period, depending on the time of picking, the object being to prevent premature defoliation.

If the schedule recommended for the control of brown-rot is followed (see *Journal* for August last), then the only additional spray required, where a special effort is being made to combat leaf-rust, is No. 5.

It is necessary to stress the fact that where leaf-rust control is aimed at all stone-fruits in the orchard should be sprayed, as if plums are left unsprayed uredospores will spread from this host to other stone-fruit trees in the vicinity.

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GORE EXPERIMENTAL AREA.

NOTES ON OPERATIONS, SEASON 1921–22.

R. B. TENNENT, N.D.D., Instructor in Agriculture, Dunedin.

THE past season's operations at the Gore Experimental Area resulted in some very instructive information being obtained, and the following summary of the work carried out should prove of special interest to Otago and Southland farmers.

SOFT-TURNIP VARIETIES.

A trial of soft turnips was carried out with a view to contrasting the yields obtained from different varieties, the seed being sown on 26th November, and the plots manured at the rate of 3 cwt. basic superphosphate per acre. The yields, on the whole, were very satisfactory, being as follows: Hurst's Imperial Green Globe, 36 tons 13 cwt. per acre; Purple-top Aberdeen, 28 tons 8 cwt.; Green-top Yellow Aberdeen, 21 tons 7 cwt.; Fosterton Hybrid, 26 tons 6 cwt.; Centenary, 31 tons 19 cwt.

In addition, a plot of Canterbury-grown Red Paragon was sown on 6th January, and a yield of 42 tons per acre was obtained. There is no doubt that just as good results can be obtained from well-grown colonial seed as from the more expensive British-grown seed, and there certainly should be a keener appreciation of this fact.

LUCERNE.

The lucerne stand at the Gore Area is 1 acre in size, and was sown in 21 in. drills during December, 1920, with a Planet Jr. seeder. No fertilizer was applied. The main seeding was Marlborough variety, but a few drills of Grimm's were also sown. Inoculated soil at the rate of 300 lb. per acre was spread immediately after sowing the seed, and the whole area then chain-harrowed. The lucerne has progressed very satisfactorily, and three cuts were obtained during last season, these giving the following yields per acre in green weight: First, 18th October, 3 tons 9 cwt.; second, 4th January, 3 tons 15 cwt.; third, 23rd February, 2 tons 7 cwt.: total, 9 tons 11 cwt. per acre—equivalent to $2\frac{1}{2}$ tons of hay. In addition, an area of four-fifths of the acre carried twenty-four two-tooth wethers from 30th April to 8th May. Allowing for this amount of grazing, it is computed that the stand of 1 acre yielded during the season 10 tons 12 cwt. of lucerne (green weight).

LUCERNE COMPARED WITH OATS AND PEAS, AND SOFT TURNIPS.

With a view to obtaining some definite information as to the value of lucerne in this district in comparison with other supplementary forage crops, it was decided last year to contrast it with oats and peas, and soft turnips. Accordingly, two plots, each of half an acre, adjacent to the lucerne stand, were set aside for the growing of these crops, particulars of which are as follows: Devonshire Greystone

turnips, sown in October, carried thirty-six hoggets for seventeen days; total yield per acre, 39 tons 15 cwt. Garton's Record oats and Grey Partridge peas, sown 18th October; yield of hay, 2 tons 2 cwt. per acre.

For the purpose of making comparison between the three crops it is perhaps best to contrast each in relation to its value from a feed-unit point of view (see A. H. Cockayne's article, "The Feeding of Dairy Cows," in the *Journal* for August, 1921). On a feed-unit basis 1 ton of lucerne hay equals 1,000 feed-units, 1 ton of oat-and-pea hay equals 800 feed-units, and 1 ton of soft turnips equals 160 feed-units. Presuming the value of a feed-unit to be 1d., then the following interesting comparison between the three crops can be made:—

Crop.	Yield per Acre.	Feed-units.	Value on Basis of 1d. per Feed-unit.
			£ s. d.
Lucerne ..	3 tons hay	3,000	12 10 0
Oats and peas ..	2 tons 2 cwt. hay	1,680	7 0 0
Soft turnips ..	39 tons 15 cwt. roots ..	6,400	26 13 4

From this it will be seen that on the feed-unit basis the turnip crop is easily the most valuable, especially when the cheapness and certainty in producing this crop are borne in mind. It might be thought, however, that for maintenance and production purposes a cow would not be able to consume sufficient turnips, especially as the feeding-value of turnips is so low in comparison with lucerne. The average cow, however, requires approximately 17 feed-units daily for maintaining herself and also for the production of the average supply of butterfat. To supply this number of feed-units 20½ lb. of lucerne hay would be required, and, as a matter of fact, this is the usual quantity consumed daily by the milking-cow. The amount of turnips required to supply 17 feed-units is approximately 123 lb., and this quantity in no way taxes the animal's digestive system. From experiments carried out at Gore it was ascertained that the average dairy cow consumed daily 130 lb. of turnips and 13 lb. straw.*

On the whole, then, the lucerne crop at Gore does not appear to hold its own in comparison with turnips, and, although it must be borne in mind that lucerne, being a permanent plant, need not be renewed for a number of years, there are obvious reasons why lucerne is not generally recommended for coastal south Otago and Southland. These reasons, stated briefly, lie in the fact that the strong natural growth of weeds which usually appears in the initial stages of young lucerne crops is such that the lucerne-growth is seriously inhibited, and under such circumstances the growing of lucerne in close drills or broadcast must be looked upon at best as a precarious undertaking. Even where the method is adopted of sowing in drills at sufficient width apart to permit of intercultivation, the constant work necessary to keep the ground free of weeds is a serious factor to be taken into consideration by the southern farmers.

* An article on special dairy-cattle-feeding tests carried out at Gore will be published in an early issue of the *Journal*.

WHEAT TRIALS.

Varieties.—Two well-known varieties were tested—Velvet Ear and White Straw Tuscan. Each plot was ¾ acre, and sowing was carried out on 26th September, 1921, at the rate of 3 bushels per acre. The manure used was 3 cwt. basic superphosphate per acre. The crop was harvested during March, with the following results: Velvet Ear, firsts, 28 bushels per acre; seconds, 4 bushels. White Straw Tuscan, firsts, 57 bushels; seconds, 2 bushels per acre. It is interesting to note that at the Winton Experimental Area these two varieties were also tested under similar conditions, and that exactly the same yield of firsts was obtained from White Straw Tuscan—namely, 57 bushels per acre. Velvet Ear, however, gave in this trial a yield of approximately 50 bushels per acre.

Manurial.—With a view to ascertaining the effect of different phosphatic fertilizers on the yield of wheat, 2½ acres of College Hunters seed was sown in September at the rate of 3 bushels per acre. The ground was divided into five plots, the fifth being used as a control. The crop was harvested in March, with the following results:—

Plot.	Manure per Acre.	Yield per Acre.		
		Firsts.	Seconds.	Total.
		Bushels.	Bushels.	Bushels.
1	3 cwt. basic superphosphate	28⅓	3	31⅓
2	3 cwt. superphosphate	26½	2¾	29¼
3	3 cwt. basic slag	28⅓	3	31⅓
4	3 cwt. Nauru raw phosphate ..	24	2¾	26¾
5	Control (no manure)	24½	3¾	28¼

As will be seen, the total yields per acre obtained from this crop were not high. A point of special interest is the fact that the more soluble forms of phosphate—super, basic slag, and basic super—gave superior results. When it is borne in mind that the "lime requirement" of this piece of land is approximately 2 tons of carbonate of lime per acre, one would have expected better results than were obtained from the use of an insoluble form of phosphate such as Nauru rock phosphate.

ENSILAGE CROPS AND ENSILAGE-MAKING.

With the object of demonstrating the making of ensilage, an experiment on the conversion of specially grown green fodder crops into silage was conducted at the area. The experimental part of the operations consisted of an oat variety trial, wherein six varieties of oats were tried out in conjunction with comparatively equal quantities of Grey Partridge peas, the sowing being simultaneous and the conditions practically even. The oats tested were saved from a crop grown on the area the previous season, the seed in the first place having been imported from England in 1920 and sown in the spring of that year. The first season's results were not a great success, but better results were anticipated from the second growing, as the varieties were then acclimatized.

The six varieties of oats were mixed with Grey Partridge peas in the proportion of 33 lb. oats to 37 lb. peas per plot of 94 ft. by 3 chains = 0·425 acre; or 70 lb. oats to 80 lb. peas per acre. This mixture gives a nicely balanced fodder, with plenty of oats to keep the crop erect, an important point when the binder is to be used. The seeding was carried out on 29th September with a manurial treatment of superphosphate at the rate of 2 cwt. per acre. The plots were sown out as follows, the oat variety specified being combined in each case with Grey Partridge peas: (1) Prolific Black Tartarian (Webb's), (2) New Market White (Webb's), (3) New Hardy Winter Black (Webb's), (4) Challenge White Canadian (Webb's), (5) Tartar King (Garton's), (6) Sable King White (Webb's).

FIG. 1. CROP OF OATS AND PEAS CUT FOR ENSILAGE PURPOSES AT THE GORE EXPERIMENTAL AREA.

Excellent weather was experienced, and the crops were left standing till 1st February, the oats at this period being rather past the milk stage and the peas in pod—the lower pods well filled. A general survey revealed that plot No. 1 looked the best, but that there was little to choose between the other varieties. The oats in plot 2 did not stand very well, the peas here being especially good, with a tendency to drag down the oats. This meant cutting with the mower instead of the binder, thus entailing extra labour. One cannot condemn the variety of oats, the yield being too good to permit of that; but it was simply a case wherein a knowledge of the habits or structure of the oat-straw should suggest a lighter seeding of peas in order to ensure a better standing crop.

Prior to being cut for stacking, areas 15 ft. wide, running right across each plot, were cut for weighing, with these very satisfactory

results per acre (green weight): Plot 1, 14 tons 19 cwt. 3 qr. 5 lb.; plot 2, 13 tons 18 cwt. 3 qr.; plot 3, 12 tons 19 cwt. 0 qr. 21 lb.; plot 4, 13 tons 19 cwt. 0 qr. 15 lb.; plot 5, 13 tons 15 cwt. 1 qr. 12 lb.; plot 6, 12 tons 0 cwt. 1 qr. 15 lb. It will thus be seen that the yield was about 40 tons, to which was added about 2 tons of rye-corn, making 42 tons of green fodder to be converted into ensilage.

Stacking commenced on 1st February, when a butt about 17 ft. by 16 ft. by 18 ft. was built, the temperature registering 125° F. by the following morning. Building was continued for eight days, when the last load was put on and the stack weighted down. Binders and drays only were used throughout the time occupied—eight days. The temperature remained evenly at 130° during operations, and the stack settled down in good order, the aroma being all that could be desired. The total (permanent) height did not exceed 6 ft. The

FIG. 2. CHOU MOELLIER CROP (HALF-ACRE) AT THE GORE AREA AFTER CARRYING TWENTY-FIVE LAMBS FOR FOURTEEN DAYS.

capacity of this stack (6 ft. by 16 ft. by 18 ft.) equalled 1,728 cubic feet, which at an average of 50 lb. per cubic foot gave 38 tons of ensilage. Reckoning the daily ration per cow as 50 lb., there was sufficient feed for twenty dairy cows for over eighty-six days, and this from 3 acres of only average land.

SUPPLEMENTARY FORAGE CROPS.

This trial was divided into two sections with a view to ascertaining the fattening-capacity of different crops. Section A comprised a trial of chou moellier against Buda kale. These crops were sown on 15th October at the rate of 1½ lb. per acre. Ten poor hill-lambs were put on each plot in March, and, in spite of the adverse weather conditions which prevailed, interesting results were recorded, particulars being as follows:—

Crop.	Average Weight of Lambs at Start.	Average Weight of Lambs at Finish.	Number of Days Grazing.	Gain.
	lb.	lb.		lb.
Chou moellier	69·9	73·8	14	3·9
Buda kale	65·1	69·5	14	4·4

Section B was divided into three plots, these being sown down in peas, oats and peas, and Broadleafed Essex rape respectively on 15th October. On 18th February ten lambs were put on each plot, and left there nine days until the 27th. A noticeable feature was the great wastage of peas, which did not appear to be readily eaten in the green stage. Recorded particulars in this trial are as follows :—

Crop.	Average Weight of Lambs at Start.	Average Weight of Lambs at Finish.	Number of Days Grazing.	Average Gain or Loss.
	lb.	lb.		lb.
Peas	66·2	59·3	10	−6
Oats and peas	63·4	60·7	10	−2·7
Broadleafed Essex rape	66·7	69·2	10	+1·5

The loss in weight of the lambs on the peas, and oats and peas, can possibly be accounted for by the fact that they would not readily eat the peas, which undoubtedly were too green when fed off; and, further, no run-off or water was supplied. Weather conditions were also unfavourable, and, on the whole, the trial was most unsatisfactory.

POTATO VARIETY TRIAL.

A number of varieties of potatoes were tested with a view to ascertaining their cropping-capacity. These were planted in the orthodox manner on 27th September, on land previously in oat-stubble, and were manured at the rate of 3 cwt. of superphosphate per acre. Lifted during May, the following yields were obtained :—

Variety.	Yield per Acre.		Per Cent. Table.	Per Cent. Seed.	Per Cent. Small.
	Tons.	cwt.			
Snowdrop	9	4	43	40	17
Russet	8	13	60	33	7
New Era	10	1	57	31	12
Arran Chief	7	4	44	41	15
Dakota Red	6	2	64	30	6

The crops on the whole were quite satisfactory, although the yields were not very high. New Era gave the best all-round result, and seems to do very well in this locality.

WINTER FORAGE CROPS.

A number of winter forage crops were tried out with a view to ascertaining their grazing-capacity. These were sown in half-acre plots on 26th November at the rate of 1½ lb. per acre, and when maturity was reached the crops were grazed with wethers, with the following results :—

Crop.	Number of Sheep.	Period of Grazing.	Total Grazing.
Chou moellier ..	40 68	18/6/22 to 21/6/22 .. 21/6/22 to 28/6/22 ..	59·6 sheep for 10 days.
Thousand-headed kale	67	28/6/22 to 3/7/22 ..	67 sheep for 5 days.
Field-cabbage ..	67	3/7/22 to 7/7/22 ..	67 sheep for 4 days.
Swedes and Thousand-headed kale	67	7/7/22 to 14/7/22 ..	67 sheep for 7 days.

It will seen that the chou moellier plot actually carried the heaviest quota, but the credit is not all due to the chou moellier. Owing to scarcity of fencing-material we were obliged to fence in along with the chou moellier the remains of the earlier fed-off fodder crops, such as rape, oats and peas, Buda kale, &c., and it is certain that there was enough feed there to carry the stock at least a few days. With the completion of the feeding-off of each successive plot of winter fodders the fence was merely shifted back to the next, and the previously fed-off area used as a run-off. As there was no fodder remaining on these run-offs, the grazing credited to the plots remaining behind the chou moellier is substantially correct.

PERMANENT PASTURE.

The permanent pasture on the area was laid down four years ago, a good mixture being used. Prior to sowing, two plots of this paddock received a top-dressing of 18 cwt. carbonate of lime per acre, but up to the beginning of last season the effect of this liming was not noticeable. As was to be expected, the pasture commenced to deteriorate, and it was consequently decided to test the effect of top-dressing a portion of the paddock. This was carried out during August, 1921, three strips being top-dressed with basic slag, Nauru raw phosphate, and carbonate of lime respectively. The paddock was cut on 19th January last, and the following yields were recorded :—

Plot.	Top-dressing.	Rate per Acre.	Yield in Green Weight.
		Cwt.	Tons. cwt.
1	Basic slag	3	4 9
2	Nauru phosphate	3	3 18
3	Carbonate of lime	6	3 8
4	Control	..	2 5

Where the basic slag was used the yield obtained was heaviest, and the profusion of clovers was extraordinary. A feature of great interest also occurred : Where the strips which had received a top-dressing of either basic slag or Nauru phosphate crossed that portion of the paddock which had been limed three years previously the growth was really remarkable, and the line of demarcation very definite, as can be readily seen in Figs. 3 and 4. Where, however, the dressings of both phosphates crossed part of the paddock which had not received lime the difference from the control plot was scarcely noticeable. The photographs showing the effect of the phosphatic top-dressing on pasture which had been limed three years previously were taken some time after the crop had been harvested, but clearly demonstrate the efficacy of liming pastures some time prior to top-dressing with a phosphatic fertilizer.

FIG. 3. PASTURE TOP-DRESSING AND LIMING AT GORE EXPERIMENTAL AREA.

Both parts of this plot received a top-dressing of Nauru phosphate. The right-hand portion (showing growth of clover) had been previously dressed with lime; the left portion had not been limed.

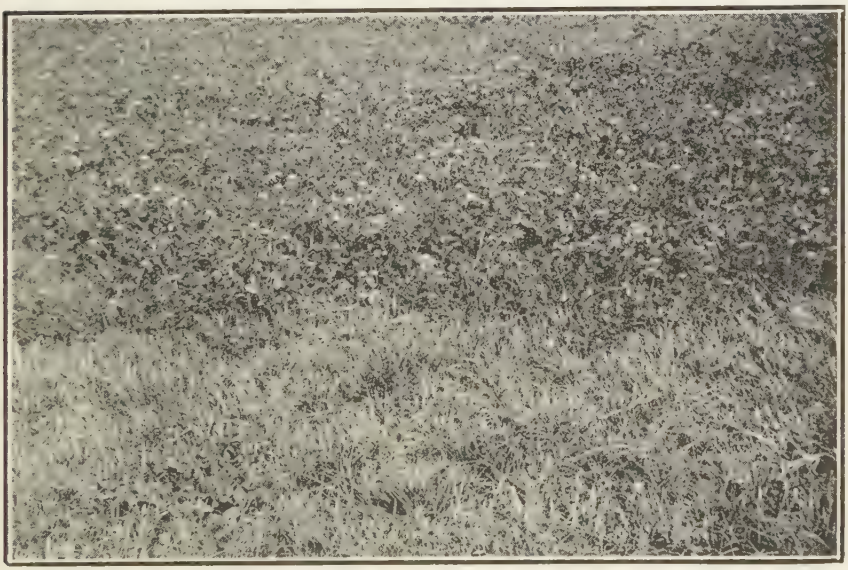


FIG. 4. ANOTHER VIEW ON THE TOP-DRESSING PLOTS.

Upper portion (showing clover-growth) dressed with a phosphatic fertilizer and previously limed. Bottom part similarly top-dressed, but land unlimed.

CLUB-ROOT INVESTIGATION.

The investigation of club-root (*Plasmidophora brassicae*) in cruciferous crops was continued on the plan outlined in last year's report (see *Journal*, November, 1921, p. 292). Cabbages were sown on a piece of ground known to be badly infected with the disease; this ground during the preceding season had been divided into five strips, to which were applied various weights of burnt lime, with a view to testing its efficacy in controlling the disease. A survey of the plots was made when the cabbages had reached maturity, and the following particulars were recorded:—

Plot.	Lime per Acre.	Total Number of Plants.	Percentage of Infection.
	Tons.		
1	2	91	26
2	16	97	13
3	Control (unlimed)	114	13
4	8	114	18
5	4	106	15

The examination for symptoms of club-root was purely macroscopic, and there is no doubt that a more detailed inspection would have given a higher percentage of diseased plants in each plot. The most striking feature of the whole test is the shown inability of lime to counteract the effect of the organism in producing the disease, and in this respect we must readjust our ideas. Preventive measures lie in the adoption of a proper rotation of crops, designed so that infected land will not be sown down in cruciferous crops for a period of at least six years. Care, of course, would have to be exercised in keeping land intended for turnips free from any source of infection, for the practice of feeding diseased turnips on uninfected ground has in the past been the most fruitful source of the spread of infection.

A scheme of rotation of crops is being carried out at the Gore Area, and in this connection it is interesting to note the effect of the above-mentioned quantities of lime in a grass-and-clover-mixture pasture, particulars being as follows:—

Plot.	Weight of Burnt Lime per Acre.	Green Weight Yield per Acre, 1922.	Green Weight Yield per Acre, 1921.
	Tons.	Tons cwt.	Tons cwt.
1	2	5 10	4 7
2	16	4 2	5 7
3	Control	1 14	2 10
4	8	4 7	4 14
5	4	5 7	3 9

These results clearly emphasize the decided advantage of using lime as a top-dressing for pastures under conditions such as prevail in the Gore district, and they explode the assumption that excessive liming is detrimental to the growth of grass.

The club-root investigation will be continued, and in due course complete results will be published. In the meantime it is essential that farmers should recognize that lime is not a "cure" for club-root,

and that the only means of prevention lies in looking upon the disease as a most contagious one, checking its spread to clean lands, starving it out of infected land, and in sowing uninfected seed on ground free from the disease.

Throughout the season many interesting and instructive features have been demonstrated, and it is only due to the efficient co-operation of Mr. W. Alexander, Fields Instructor, Invercargill, and Mr. T. Pattinson, Overseer of the area, that the results obtained and here recorded were made possible.

BABCOCK BUTYL ALCOHOL TEST FOR BUTTERMILK AND SKIM-MILK.

THE original method for testing the fat-content of skim-milk, buttermilk, and whey by the Babcock test is practically the same as for whole milk, except that a little more sulphuric acid is used and the bottle whirled a little longer, while to the fat results shown it was considered advisable to add 0·05 per cent., so as to allow for the small amount of fat unavoidably left in the residuum of the test.

This method has recently been improved upon by the addition of a small amount of butyl alcohol, and the results obtained correspond closely to those of chemical analysis. Operators are therefore recommended to use this method and discard the other. Instructions for operating are as follows :—

(1.) Use a Babcock skim-milk test-bottle with a graduated scale reading to 0·5 per cent. for a 17·6 c.c. sample.

(2.) Place in the bottle, in the order indicated, 2 c.c. of normal butyl alcohol, 9 c.c. of buttermilk or skim-milk, 7 to 9 c.c. of ordinary milk-testing sulphuric acid. The amount of acid can be varied to suit its strength ; the right amount is being used when the fat-column is golden yellow to light amber in colour.

(3.) Mix contents thoroughly.

(4.) Place bottle in tester and whirl for six minutes. The tester must be run at its proper speed, and not allowed to cool during the whirlings.

(5.) Add hot water (rain or distilled) to fill bottle to bottom of neck, and whirl two minutes.

(6.) Add balance of water to float fat into neck, and whirl two minutes.

(7.) Read at temperature of 135° to 140° F. Double the reading to obtain percentage of fat.

(8.) In cleaning test-bottle—especially if there be any deposit—first add a small amount of lukewarm water, and to this add sulphuric acid. Always add the water first and then the acid, never the reverse. Rinse the bottle well with this mixture, and then rinse with hot water.

—W. E. Gwillim, Assistant Director, Dairy Division.

BOYS' AND GIRLS' AGRICULTURAL CLUBS.

THE WILSON CUP AWARD: SEASON 1921–22.

THE Stuart Wilson challenge cup for competition among boys' and girls' agricultural clubs throughout the Dominion has been awarded this year by the Director-General of Agriculture, Dr. C. J. Reakes, to Dorothy Ward, of Okaiawa, whose crop of mangolds won the South Taranaki championship for last season, as recorded in the *Journal* for August.

The wonderful crop grown by this girl competitor, which is well shown in the accompanying photographs, weighed 152 tons 10 cwt. per acre. The mangolds were grown in drills 22 in. apart, and thinned out to 14 in. in the drills. The manure given consisted of three parts superphosphate, one part bone-meal, and one part Ephos phosphate, at the rate of 5 cwt. per acre. In addition, salt at the rate of 3 cwt. per acre was broadcasted just before the seed was sown. The variety was Sutton's Prizewinner. The land was fairly rich, having been a pig-paddock some years ago. This no doubt helped towards the heavy return, but a great deal is attributable to the thorough cultivation given by the grower.

The winner of the Wilson cup for the preceding season (1920–21) was a boy, O. Gould, of Hampden School, Otago, with a potato crop yielding 22 tons per acre and securing 96 marks out of a possible 100, in a competition conducted under the auspices of the Otago Expansion League and the Department of Agriculture. The Otago entrant for the cup this year (and who was "runner-up" in the award) was a girl, Ivy Pearson, of Beaumont School, with a crop of Arran Chief potatoes weighing 26 tons per acre. This competitor secured 98 marks —50 for yield, 20 for profit, and 28 for record-card. The other placed competitors in the Otago potato competition of 1921–22 were Frances Johnson, Momona, 22·2 tons, 88 marks; J. R. Gall, Momona, 19·7 tons, 84 marks; and D. Woodley, Hampden, 18·6 tons, 79 marks.

New Rabbit Districts.—The constituting of the Mataitai-Orere (North Auckland) and Moawhango (Wellington) Rabbit Districts, under Part III of the Rabbit Nuisance Amendment Act, 1918, is gazetted.

Private and Local-body Tree-planting.—The annual report of the State Forest Service for 1921-22 states that it is gratifying to note the substantial and increasing interest in the establishment and growing of tree plantations, shelter-belts, wood-lots, county and municipal forests, by the farmers, settlers, cities, towns, counties, other local bodies, and by corporations. From the two main sources of supply—*i.e.*, the Forest Service and the associated nurserymen—over four million trees (and more than 400 lb. of tree-seeds from the Forest Service) were disposed of to private planters during the year, as compared with a sale of probably a quarter of that amount for the previous year. The New Zealand Association of Nurserymen undertook to supply trees at the same prices as the Forest Service, and this undertaking has been continued for the current calendar year.

FIG. 1. DOROTHY WARD'S MANGOLD CROP, WHICH WON THE SOUTH TARANAKI CHAMPIONSHIP AND HAS BEEN AWARDED THE WILSON CUP FOR 1921–22.

Dorothy Ward, whose crop yielded at the rate of 152 tons 10 cwt. per acre, is standing on left of picture. Her sister, Erna Ward, who came second in the South Taranaki Championship with 141 tons 11 cwt., is on right.

FIG. 2. GENERAL VIEW OF DOROTHY AND ERNA WARD'S CHAMPION MANGOLD CROPS AT OKAIAWA, TARANAKI.

WEEDS AND THEIR IDENTIFICATION.

(Continued.)

FIELD-HORSETAIL (*EQUISETUM ARVENSE*).

ESMOND H. ATKINSON, Biological Laboratory, Wellington.

A SHORT time ago Mr. J. McGregor, of Wanganui, forwarded to the Biological Laboratory specimens of a weed which has been identified as field-horsetail (*Equisetum arvense* L.). So far as is known this is the first record of the occurrence of a member of this genus as a naturalized plant in New Zealand, though certain species have been cultivated in gardens here. The horsetails belong to a small family (Equisetaceae) not closely related to any other living plants, and consisting of the single genus, *Equisetum*, which contains about twenty-five species of wide distribution in Europe, Africa, Asia, and America. The species now living are mostly quite small plants, seldom more than a few feet in height, but fossil remains show that their representatives in the Carboniferous period were gigantic, and must have formed a conspicuous feature of the vegetation.

The species described in this article is found as an indigenous plant in America, Europe, and Asia, extending east as far as Japan. Mr. McGregor considers that the weed owes its origin here to plants accidentally introduced with iris-roots from the latter country, a likely enough explanation in view of the similarity of habitat of the two plants, and the readiness with which the horsetails will grow from small pieces of their underground stems.

DESCRIPTION

Equisetum arvense is a herb with widely creeping perennial underground stems, which root at the nodes or joints, and which give rise in the spring to two different kinds of shoots in succession. The first to appear are the cone-bearing or fertile shoots, which consist of pale-brown, cylindrical, longitudinally grooved, unbranched stems 4 in. to 10 in. high, ringed at intervals with eight to twelve toothed sheaths, and ending in a club-shaped cone. The great sub-kingdom (Pteridophyta) to which the horsetails belong, of which the ferns and lycopodiums are familiar examples in New Zealand, exhibits very clearly what is known as the alternation of generations. The conspicuous horsetail or fern plant possesses no sexual organs, but produces one-celled bodies of microscopical size known as "spores," which fall to the ground and germinate, giving rise to minute plants in no way resembling the spore-bearing ones, and from their small size generally escaping notice altogether. On these prothalli, as they are called, the sexual organs are borne, the embryo resulting from the fusion of the male and female cells ultimately developing into a conspicuous spore-bearing plant like that of the previous generation. The spores in *Equisetum* are enclosed in sporangia or spore-cases carried on the under-surface of stalked dome-shaped scales, which are themselves arranged round the club-shaped end of the fertile shoot (see figure). The fertile shoots are short-lived, and, after shedding their spores, soon shrivel, and are overtopped by the quite different-looking sterile

HORSETAIL (EQUISETUM ARVENSE).

(*a*) Sterile shoots (half natural size); (*b*) junction of stems and branches (enlarged); (*c*) fertile shoots (half natural size). Original.

shoots, which are slender, bright green in colour, and 1 ft. to 2 ft. high. The stems of the sterile shoots, like those of the fertile ones, are longitudinally grooved, and encircled at intervals with toothed sheaths consisting of minute scale-like leaves; but, instead of remaining unbranched, the sterile shoots produce early in their development a series of rings of slender four- or, rarely, three-angled branches, springing from just below the sheaths. The branches, like the stems, are divided into a number of segments with a toothed sheath at each joint (see enlarged figure). Both fertile and sterile shoots are fragile, breaking easily at the joints when pulled. The stems are somewhat harsh to the touch owing to the presence in them of silica; but *Equisetum arvense* is less remarkable in this respect than some other species, in which the silica is so abundant that the plants are used for scouring metals. In general appearance the sterile shoots of the field-horsetail are not unlike slender pine-shoots with their needles, and for this reason the plant is often known as "field-pine."

POSITION AS A WEED.

Owing to its limited distribution in New Zealand not much can be said as to the potentialities of field-horsetail as a weed in this country, but Mr. McGregor's account of it is not reassuring on this point. He states that in about seven years it has established itself in an area ranging from below tide-level in an estuary to a dry paddock, where it seems likely to submerge the finer grasses. This is in accord with the experience in Europe and America, where it is looked upon as a very bad weed of both arable and grass land, its deep and widely spreading underground stems (broken pieces of which are able to produce new plants) making it difficult to eradicate. Sandy or gravelly soil with a considerable amount of moisture seems most suitable to its full development, and thorough drainage of the area, combined with such cultivation methods as will prevent the formation of the green sterile shoots, is the most effective control measure. In pastures where a mower can be used the green shoots could be kept down by its means, and the underground stems thereby starved.

POISONOUS PROPERTIES.

A good deal has been written on the subject of the poisonous properties of the horsetails, and it has been proved beyond question that some of the species are dangerous to horses and cattle, particularly to the former. There is still some doubt, however, as to whether field-horsetail should be included among the poisonous species, evidence both for and against this being available. In the green stage the horsetails seem harmless, and it is only when eaten in hay that they cause any trouble. The symptoms of *Equisetum* poisoning in horses vary in acuteness, in some cases the first signs of anything wrong being unthriftiness and wasting of the muscles, while other cases are marked by excitement and anxiety. Reeling and staggering, together with loss of power in the limbs, and, later, disturbances in nutrition, are characteristic symptoms. Death may follow in a few hours or may not occur for several weeks, but most cases respond to prompt treatment, the most important thing being to stop immediately the feeding to the animal of the hay containing *Equisetum*.

NOTE.—The writer is indebted to Mr. J. McGregor both for the information contained in his original letter and for sending further specimens of the weed from which the accompanying illustration was made.

AGRICULTURAL ROOT SEEDS.

NELSON R. FOY, Biological Laboratory, Wellington.

THE root crops most commonly sown in New Zealand farming are turnips, swedes, mangolds, and carrots, and of these the first two are by far the most widely used. While rape and kale do not strictly come under the heading of "roots," they belong to the same family as turnips and swedes—the Brassicas—and will be included in these notes.

By far the greater part of our root seed is imported, mainly from Great Britain, where much time is given to the perfection of new varieties and the keeping of existing strains pure. Trueness to type is a highly important factor in the production of root seeds. With careful attention to the avoidance of cross-fertilization, turnip or swede seed of a type equal or superior to that imported can readily be produced in New Zealand, and, as described in last month's *Journal*, this is being done on a considerable scale by Mr. Norman Campbell, of Orari. A considerable quantity of good rape-seed is also harvested in the Dominion, and is readily absorbed by the trade. It is always of a high germination, and compares favourably with the imported article.

GERMINATION.

The Brassicas here dealt with are all strong-germinating seeds, rape being the highest and kale the lowest of them. The following are the germination percentages to be expected from new season's seed, and the average of commercial seed: Rape, 98, average 95; turnip, 95, average 90; swede, 95, average 90; kale, 85, average 80.

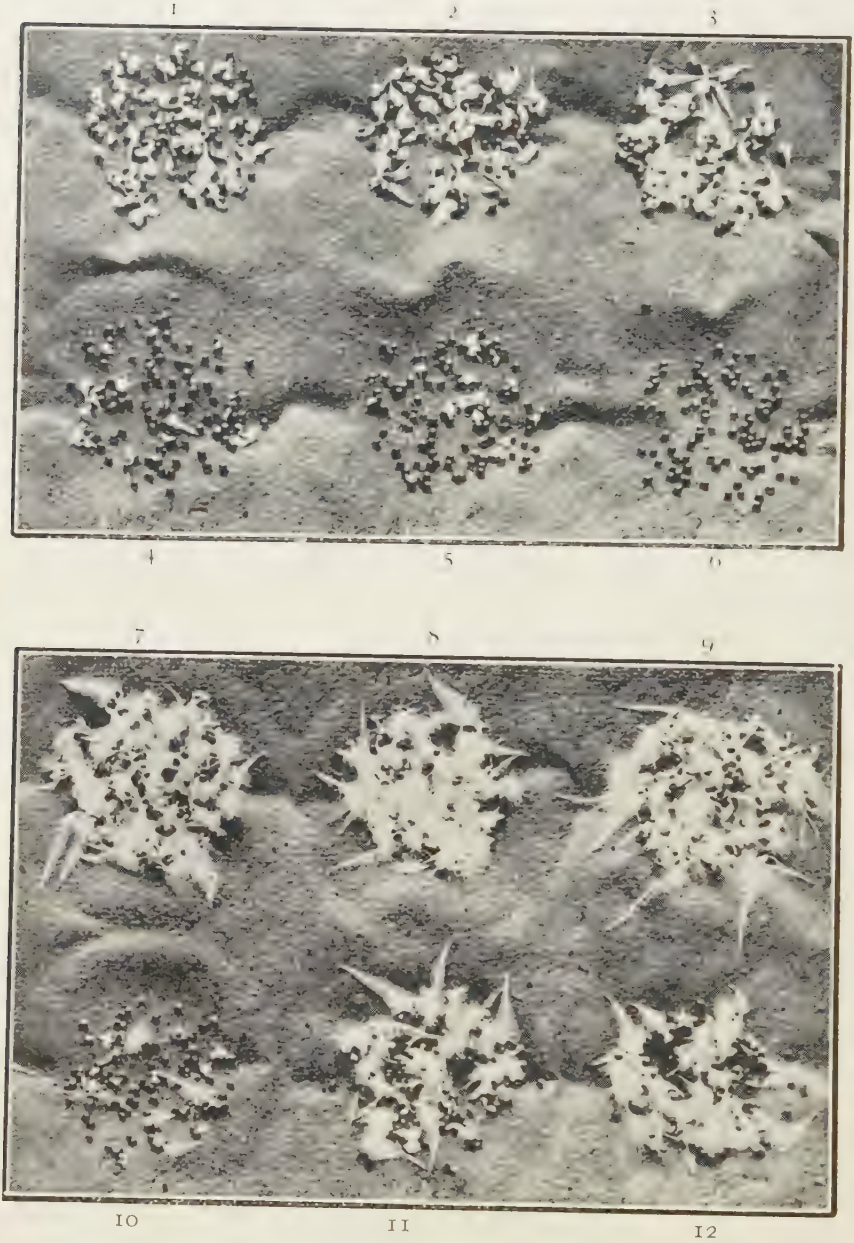
With mangolds it will be noticed that if a certain number of seeds are sown considerably more than that number of plants are obtained. This is due to the fact that the so-called seed is a cluster containing several true seeds—from one to four, the average being about two and a half. The resulting germination on a hundred clusters is therefore usually considerably over 100 per cent. A good average line should show from 130 to 150 per cent. Anything under 100 per cent. should be avoided, as it would in all likelihood be old seed. The highest germination ever recorded in this Laboratory was 420 per cent.—or, more correctly, 420 sprouts per 100 clusters—but anything approaching this is, of course, exceptional.

Carrots and parsnips are weak in germination, the former averaging 65 to 70 per cent. and the latter 45 to 50 per cent. Parsnips are not of much importance, however, only small quantities being sown.

It is frequently argued that in the case of mangolds a high germination is unnecessary, as a thick, heavy growth means a considerable amount of thinning-out. In theory this is true, but it has to be remembered that high germination is indicative of fresh seed, while a low germination usually indicates old seed of a low vitality.

PURITY.

On account of the growth-form of the plants of agricultural roots, impurities in the seed are uncommon. The Brassicas (the easiest to



VARIOUS TYPES OF TURNIP-SEED AFTER TWO DAYS IN THE GERMINATORS AT THE BIOLOGICAL LABORATORY.

1, 2, and 3—one- to two-year-old seed, showing fairly good germination but weak growth. 4, 5, and 6—very old seed. 7, 8, and 9—new season's seed; note strong growth of root-system. 10, 11, and 12—old and new seed mixed; note strong growth of new seed among the weaker old seeds.

[*Photos by E. Bruce Levy.*

dress) show the greatest purity, cleavers being the only common impurity. The most dangerous possible impurity is, of course, wild turnip, the seed of which is not easily distinguished in a sample. It is only by an examination with a high-power glass of the surface-markings of the seed that its presence in a sample can be ascertained. The occurrence of wild-turnip seed in any quantity is rare.

The chief impurities of mangold-seed are bindweed and cleavers, but the percentage is very small. Carrots may contain up to 1 per cent., smartweed and fat-hen being the most common. Parsnip-seed is always practically pure. It can be taken, therefore, that with rare exception root seeds are 99·9 per cent. pure.

SIZE AND COLOUR.

To all appearances individual seeds of the Brassicas are identical, but a critical examination of the surface-markings will enable the species to be identified with a fair degree of certainty. In bulk, however, with some exceptions, it is not difficult to distinguish one species from another. Rape is the largest seed, and is black in colour, with a slight polish. Swede is slightly smaller than rape, and a little larger than turnip. It is usually of a deep purplish-black, although some varieties show seed of a reddish tinge, which is liable to cause it to be confused with turnip. Turnip is the smallest of all the Brassica seeds, and is reddish-black, the red predominating in many of the seeds. Kale-seed is about the size of swede, and has rather a dirty, smoked appearance.

Good mangold should be of a bright-brown colour, carrot a greyish-straw, and parsnip straw with darker-coloured oil-canals. New carrot and parsnip seed has a pronounced aromatic smell.

ADULTERATION.

Root seeds are rarely adulterated with other seeds, but there is in some cases a mixing of high- and low-germinating lines. This is often shown by the germination when there are numbers of strongly rooted seedlings among numbers of a much weaker growth. For example, a line of swede consisting of two parts of a 100-per-cent. line and one part of a 70-per-cent. line of old seed would give an average germination of approximately 90 per cent., of which about one-quarter would show a weaker growth.

The practice of improving the appearance of an old line of Brassica-seed with oil or graphite was at one time of common occurrence in Europe, and a few cases have been met with in New Zealand. Graphite brightens up a line of swede or rape seed wonderfully, and if occasionally used in this country it is not with the idea of passing off old seed as new, but for imparting to a line of swede with a turnipy appearance the rich, black, semi-polished appearance typical of most of the varieties of swedes. As already mentioned, the seed of some varieties of swedes has the reddish tinge of turnips, and its appearance suggests the presence of a considerable proportion of turnip-seed. All graphited lines tested at this Laboratory have germinated well, but one cannot be too careful. If such seed is rubbed between the hands or on a sheet of white paper the presence of the graphite will immediately be shown.

While on the subject of adulteration it may be of interest to mention that in Europe before the advent of seed-testing and seed-legislation Brassica-seed was often adulterated with small stones, hardly distinguishable in the sample from genuine seed. Another common practice was to kill—by baking—the seed of charlock (a weed of the Brassica family) and mix it with good turnip-seed. In such a case all the seed which grew was good, but the purchaser was deceived as to the amount he bought.

A NEW APPLE-TREE BORER.

NAVOMORPHA SULCATUS.

DAVID MILLER, Entomologist, Wellington.

RECENTLY specimens of twigs and branches from apple and almond trees infested by the larvæ of a long-horned beetle were received from Taranaki. An examination showed that the larvæ belonged to a native species of beetle, the pine longhorn (*Navomorpha sulcatus* Fabr.), which first became important 'ast year as a destructive insect attacking the insignis pine (*Pinus radiata* Don.).

The adult beetle, large numbers of which emerge in August of each year, is a very conspicuous insect (Fig. 1). It is narrow-bodied, tapering posteriorly, and measures just under ½ in. in length. The colour is blackish-brown with a greenish sheen; down each side is a broad greyish-white split stripe, and a fork-shaped one is in the middle toward the posterior end. The antennæ are very long, though not as long as the body, and when at rest are frequently held projecting backward along the sides.

By means of her awl-like ovipositor the female bores small holes in the bark of branches and twigs, and places therein her pearl-white eggs. The young larvæ, on hatching from the eggs, bore through the wood, cutting out a burrow through the heart-wood, but as they grow the burrows (Fig. 4) increase in size accordingly, and the larvæ are frequently found gouging grooves immediately beneath the bark. The young larvæ are often located in terminal shoots, from which they devour all but the shell of bark. The whitish larva (Fig. 3) is of the "round-headed" type, and when fully developed is about as long as, or a little longer than, the adult. It is cylindrical, and rather broader at the head end, which is brownish. The body-segments are well marked off by restrictions, while the legs are very small and inconspicuous, a pair being present on each of the first three segments behind the head.

When fully developed the larva blocks its burrow in front and behind with plugs of shredded wood, so as to form a compartment more or less secure from intruders, and in this retreat it transforms to the pupa (Fig. 2). Along the under-side of the latter the appendages of the future beetle are folded. The beetle, on emerging, works its way to the bark, through which it escapes by an oval-shaped hole.

In order to reduce infestations, branches containing larvæ and pupæ should be cut out and burned before August. If the infested

parts are large, good results might be obtained by locating the burrows and injecting carbon bisulphide into them by means of an oil-can, and blocking up with clay any near-by holes in the bark.

THE LONGHORN BEETLES.

The long-horned beetles (Cerambycidae), to which *N. sulcatus* belongs, comprise a large family of wood-borers, and there are a great many native species in the Dominion. Common examples are the

NAVOMORPHA SULCATUS.
Fig. 1. Adult beetle. Fig. 2. Pupa. Fig. 3. Larva. All × 4.

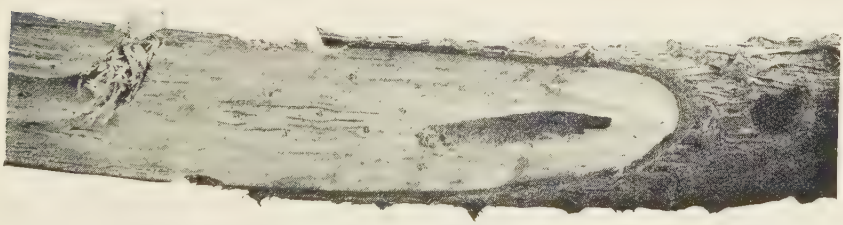


FIG. 4. INSIGNIS-PINE BRANCH DAMAGED BY LARVÆ OF NAVOMORPHA SULCATUS.

lemon-tree borer, the fig-tree borer, and the *huhu*. The beetles themselves are readily recognized by their long antennæ, in some cases longer than the body, which is more or less elongate, sometimes narrow, and usually cylindrical, though frequently rather flattened along the part covered by the wing-cases. Some species are among our largest insects, while others are comparatively small. A number of them are powerful fliers, and emit a loud droning while on the wing, frequently being attracted to lights at night. Others, again, are more

or less sluggish, and remain motionless even when roughly disturbed. Several species when at rest create a faint though distinct "squeak." The stridulating organ of such forms is situated on the back, and consists of a triangular process projecting forward, under the front part of the thorax, from the middle of the body where the wing-cases are attached. The inner surface of the front part of the thorax is drawn over the point of this process, and creates the characteristic squeak, which is quite audible even when the beetle is within a branch. Other species stridulate by rubbing the hind femora against the edges of the wing-cases.

The larvæ have a small head and a fleshy cylindrical body, with the segments distinctly separated from each other; the front end is broadened and tapers posteriorly somewhat. While some possess three pairs of very small legs, there are others quite legless.

TESTING OF PUREBRED DAIRY COWS.

OCTOBER CERTIFICATE-OF-RECORD LIST.

THE following list, comprising the records of cows which qualified for certificates during October, 1922, is supplied by the Director of the Dairy Division, Mr. W. M. Singleton. It will be noticed that, in addition to the new champion record, the list contains several exceptionally high performances. Some special notes and a photograph of the champion cow Alcartra Clothilde Pietje are published elsewhere in this issue.

LIST OF RECORDS.

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat
FRIESIANS.						
Junior Two-year-old.		Yrs.dys.	lb.		lb.	lb.
Ryvington Thora ..	Estate of T. O. Hodgson, decd., Tamahere	2 130	253·5	342	12,609·0	458·03
Springfield Daffodil..	Mrs. L. M. F. Pirie, Woodlands	2 178	258·3	365	11,980·0	448·96
Heilo Fayne Johanna	W. Barton, Featherston	2 66	247·1	365	13,877·4	438·25
Heilo Linda ..	W. Barton, Featherston	2 47	245·2	365	13,058·6	424·75
De Kol's Holly ..	W. R. Wright, Matangi	1 303	240·5	359	11,176·8	383·80
Galatea Segis of Ngatoro	Baldwin and Son, Inglewood	2 75	248·0	290	11,720·0	361·77
Rose of Ngaere ..	C. J. Schumacher, Ngaere	1 266	240·5	351	9,406·2	339·53
Nancy of Fairburn ..	F. Crump, Springston	2 53	245·8	353	7,648·6	288·13
Senior Two-year-old.						
Ryvington Sheila ..	Estate of T. O. Hodgson, decd., Tamahere	2 356	276·1	365	13,612·3	493·84
Salma Careme ..	W. Barton, Featherston	2 201	260·6	365	16,338·3	490·47
Cluny Queen Pietje Buttercup	Cluny Friesian Farm Company, Wellington	2 248	265·3	359	13,313·6	461·93
Monavale Coral Paxton	E. F. Walford, Aongatete	2 287	269·2	365	10,534·8	368·61

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		FRIESIANS—*continued.*				
Junior Three-year-old.		Yrs. dys.	lb.		lb.	lb.
Princess Van Friesland Park II	Cameron Bros., Stratford	3 182	295·2	358	15,468·2	483·01
Senior Three-year-old.						
Marchioness of Carlowrie	R. K. Macdonald, Edendale	3 348	311·8	319	16,798·5	540·17
Carlowrie Tirania ..	R. K. Macdonald, Edendale	3 308	307·8	316	15,366·0	505·15
Royal Diamond ..	Estate of T. O. Hodgson, decd., Tamahere	3 321	309·1	365	16,678·7	490·01
Pareora Erica ..	A. S. Elworthy, Timaru	3 268	303·8	365	12,619·6	399·85
Lady of Brookdale II	J. H. Jamieson, Cambridge	3 240	301·0	365	12,235·6	389·38
Junior Four-year-old.						
Pareora Sigrid ..	R. J. Potter, Pukerau	4 51	318·6	340	13,220·5	494·82
Senior Four-year-old.						
Edgewood Pearl	Bloomfield Farm Company, Wellington	4 324	345·9	365	17,360·9	638·77
Coldstream Tilly III	Cameron Bros., Stratford	4 347	348·2	315	14,161·5	495·57
Mature.						
Alcartra Clothilde Pietje	V. Marx, Mangatoki ..	7 355	350·0	365	31,312·5	1145·24
Domino Manor de Kol	L. R. Stoddart, Willowby	6 159	350·0	365	18,351·9	573·24
Halcombe de Kol ..	F. Crump, Springston	8 279	350·0	365	13,109·6	498·68
Countess Viola Burke de Kol	Parkinson Bros., Opotiki	9 57	350·0	347	13,717·5	491·95
Aaggie Clothilde de Kol	Parkinson Bros., Opotiki	7 326	350·0	299	15,083·9	442·08
Ellesmere Darkie ..	G. H. Hassall, Ellesmere	6 40	350·0	266	11,485·9	372·60
		JERSEYS.				
Junior Two-year-old.						
Silverdale Jean ..	G. Hodgson, Whakapara	1 327	240·5	354	8,780·8	567·30
Sweet Bint ..	A. E. Phillips, Maunu	2 0	240·5	319	9,965·5	562·19
Meadowvale Black Pearl	E. O'Sullivan and Sons, Tariki	2 7	241·2	351	9,086·9	520·40
Erindale Beauty's Trix	T. H. Broomfield, Auroa	1 312	240·5	365	8,970·1	508·06
Majesty's Swan's Star	A. J. Dempsey, Horsham Downs	1 290	240·5	365	10,030·8	496·34
Bilberry's Favourite	W. Pollock, Stratford	2 17	242·2	351	8,449·8	492·69
Linden Grove's Pearl	Mrs. M. A. Gadsby, Stratford	2 35	244·0	365	8,617·7	491·84
Nancy of Pelynn ..	L. K. Tarrant, Ngaere	2 8	241·3	341	8,342·0	472·29
Pelynn Lassie ..	L. K. Tarrant, Ngaere	1 357	240·5	350	7,190·0	466·89
Belle Olga ..	A. N. Haylock, Stratford	1 358	240·5	365	8,580·8	465·28
Miro Meadow's Floria	A. A. Ward, Tariki ..	1 351	240·5	365	7,268·1	460·29
Marshland's Stylish Princess	W. J. Chynoweth, Hamilton	1 291	240·5	365	6,264·2	458·38

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Junior Two-year-old —continued.		Yrs. dys.	lb.		lb.	lb.
Woodstock's Crocus..	S. Styles, Johnsonville	2 6	241·1	365	7,225·6	440·76
One I Love ..	G. E. Cowling, Manaia	2 0	240·5	361	7,491·5	440·52
Pretty's Princess ..	C. Jones, Manaia ..	2 1	240·6	350	7,947·5	440·43
Marshland's Rose Queen	W. J. Chynoweth, Hamilton	1 309	240·5	365	7,310·1	438·21
The Real Lady ..	G. E. Cowling, Manaia	2 38	244·3	345	7,181·6	435·21
Ohio's Eminent's V.C.	A. H. Guy, Mangatoki	1 260	240·5	365	7,148·4	429·27
Alfalfa Twylight ..	F. J. Saxby, Ohaupo	1 336	240·5	365	7,826·3	425·71
Fuchsia's Golden Fern	C. Meuli, Tariki ..	2 19	242·4	365	7,085·5	424·12
Bridgeview's Lass ..	A. L. Hooper, Mahoe	2 22	242·7	303	7,808·7	420·20
Kaucket's Ruth ..	G. T. Gibbons, Ngaere	1 334	240·5	364	7,188·3	412·57
Maid's Noble Pet ..	F. E. Southcombe, Manaia	2 5	241·0	349	7,021·4	406·52
Caresse of Rosy Creek	G. T. Gibbons, Ngaere	1 274	240·5	330	6,872·0	405·26
Kaucket's Winsome	G. T. Gibbons, Ngaere	1 241	240·5	336	7,544·2	400·46
Jersey Brae's Oaks ..	F. J. B. Ryburn, Ohaupo	1 346	240·5	365	7,469·7	395·67
Daystar's Choice ..	C. Meuli, Tariki ..	2 15	242·0	365	6,834·2	395·52
Bridgeview's Lady ..	A. L. Hooper, Mahoe	2 13	241·8	295	7,075·8	388·92
Roslyn Sweet Foxie..	J. Harris, Bombay ..	1 347	240·5	353	7,152·7	383·19
Urewera Rita ..	J. S. Rae, Taneatua ..	1 360	240·5	331	7,182·0	372·81
Belvedere Reflection	A. L. Clark, Hamilton	1 314	240·5	365	6,464·0	368·64
Passadena of Rosy Creek	A. L. Hooper, Mahoe	2 63	246·8	275	5,827·5	367·14
Te Maire Diamond ..	R. L. Tippler, Shannon	1 348	240·5	365	6,315·2	365·70
Meadowvale Doreen ..	E. O'Sullivan and Sons, Tariki	1 353	240·5	305	7,015·2	359·21
Brooklyn's Barbara..	H. J. Lancaster, Glen Oroua	2 34	243·9	365	7,060·1	342·89
Spec's Fancy ..	A. J. Harris, Bombay	1 253	240·5	355	6,449·3	333·90
Storm's Iris ..	F. J. B. Ryburn, Ohaupo	2 53	245·8	323	5,743·0	319·38
Newland's Sunbeam	M. J. Lenihan, Levin	2 28	243·3	319	4,979·8	318·32
Yucca	P. J. Small, Kairanga	1 340	240·5	342	5,082·8	317·56
Willow Bank Duchess	F. Ranford, Stratford	1 358	240·5	365	5,735·0	315·39
Dazzle	G. E. Cowling, Manaia	2 14	251·9	301	5,708·1	314·25
Sybil's Queen ..	D. L. A. Astbury, Mangatoki	1 264	240·5	322	4,909·9	304·94
Golden Gift ..	F. J. B. Ryburn, Ohaupo	1 362	240·5	321	6,526·8	303·27
Roslyn Favourite Comedy	J. Harris, Bombay ..	1 290	240·5	349	5,323·3	298·71
Roslyn Gay Bon ..	J. Harris, Bombay ..	1 271	240·5	349	5,645·3	293·14
Trethella's Silvo ..	A. Buchanan, Palmerston North	2 6	241·1	357	4,982·5	289·25
Juno's Duchess ..	A. J. Harris, Bombay	1 357	240·5	356	4,796·9	285·28
Dainty Doris ..	F. J. B. Ryburn, Ohaupo	1 335	240·5	338	4,386·5	279·30
Evolution	Clague Bros., Manaia	1 335	240·5	267	5,305·4	278·37
Exquisite White Stockings	J. Meuli, Normanby ..	2 46	245·1	290	4,772·4	277·37
Rosendale's Sylvia ..	R. J. Ballantine, Normanby	2 7	241·2	309	4,991·5	273·76
Meadowvale Mascot..	E. H. Linnell, Midhirst	2 1	240·6	342	5,166·7	268·08
Idol's Maid ..	Clague Bros., Manaia	2 20	242·5	267	4,477·4	252·92

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Senior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Croydon's Duchess ..	W. Crosby, Waipuku	2 100	250·5	365	8,645·2	546·30
Golden Vein ..	G. E. Cowling, Manaia	2 355	276·0	365	9,029·7	516·10
Jersey Bank Joy ..	C. G. Meuli, Tariki ..	2 351	275·6	365	8,341·7	500·20
Pencarrow's Chief Lady	Mrs. C. Day, Tamahere	2 297	270·2	365	7,042·5	440·87
Gossiper	H. Shepherd, Te Rapa	2 336	274·1	365	7,998·8	439·52
Silver Flower ..	Mrs. C. A. Care, Cambridge	2 347	275·2	353	8,505·3	434·16
Silverdale Hope ..	G. Hodgson, Whakapara	2 340	274·5	323	7,482·4	432·32
Jersey Brae's Faithful	T. Church, Te Rapa ..	1 340	240·5	365	7,019·4	417·73
Royal Miss ..	J. Meuli, Tariki ..	2 214	261·9	364	6,977·4	376·81
Jersey Brae's Delight	T. Church, Te Rapa ..	2 20	242·5	355	6,931·8	359·45
Derelict of Bulls ..	F. J. Watson, Bull's ..	2 334	273·9	342	7,072·9	336·57
Silvanus	W. H. Waterhouse, Runciman	2 228	263·3	322	5,654·5	320·06
Three-year-old.						
Miro Meadow Topsy	A. A. Ward, Tariki ..	3 259	302·9	365	11,209·8	606·82
Lady Morecraft ..	C. Brock, Eltham ..	3 247	301·7	365	11,084·4	604·84
Mitylene	S. A. Tippett, Okaiawa	3 29	279·9	365	10,679·6	599·85
Soumise Arrabelle ..	E. Bennett, Cardiff ..	3 339	310·9	365	11,569·0	597·31
Mistletoe of Pelynn..	L. K. Tarrant, Ngaere	3 12	278·2	343	10,191·5	580·67
Paratawhiti Riverbloom	E. R. Bayly, Omata..	3 345	311·5	365	9,992·9	537·89
Oakland's Ayesha ..	F. W. Cornwall, Bell Block	3 40	281·0	339	9,598·0	536·50
Goneril	C. G. Gibbons, Ngaere	3 24	279·4	315	7,814·0	535·34
Love's Desire ..	R. R. Dean, Te Kumi	3 6	277·6	353	8,720·3	531·54
Waipiko Butter Maid	C. G. C. Dermer, Cheltenham	3 2	277·2	340	9,548·5	515·83
Starlock's Solid Gold	G. E. Cowling, Manaia	3 299	306·9	365	9,058·8	494·13
Fury's Solid Gold ..	G. E. Cowling, Manaia	3 111	288·1	356	8,572·3	488·62
Sunny Meadow's Starlight	F. J. Wyatt, Towai ..	3 50	282·0	365	8,324·9	484·84
Rewa Tui	G. T. Gibbons, Ngaere	3 323	309·3	365	7,818·4	483·64
Glenmore Belle ..	A. C. Lovelock, Woodville	3 339	310·9	349	9,727·6	479·89
Wee Wairoa ..	W. Pollock, Stratford	3 337	310·7	331	8,144·4	477·65
Viola's Daisy Girl ..	W. H. Fitness, Rehia	3 15	278·5	321	7,103·7	404·48
Richwood Sylvia ..	W. H. Fitness, Rehia	3 49	281·9	331	7,366·5	400·54
Lady Hillview ..	R. K. Garland, Okauia	3 66	283·6	314	6,651·0	351·61
Rewa Naiad ..	C. H. Sharp, Te Roti	3 352	302·2	267	6,600·7	345·48
Twinkler	J. Bones, Waihou ..	3 290	306·0	365	5,439·7	325·04
Four-year-old.						
St. Lambert's Bell ..	A. J. Smith, Cardiff ..	4 283	341·9	365	14,423·1	780·32
Twylish's Darkie ..	F. J. Saxby, Ohaupo..	4 297	343·2	365	11,621·8	714·14
Fancy's Pet ..	C. A. Care, Cambridge	4 347	348·2	365	12,480·5	611·57
Bilberry's View ..	A. H. Guy, Mangatoki	4 289	342·4	348	9,826·0	557·60
Secret	J. Nicholson, Manakau	4 13	314·8	365	11,723·6	542·02
Magnate Lass ..	W. A. Guy, Matapu ..	4 351	348·6	339	8,137·8	477·07
Tuberose	R. C. Henry, Bell Block	4 324	345·9	365	7,400·6	462·35
Royal Jenny ..	A. C. Lovelock, Woodville	4 210	334·5	356	8,365·9	445·86
Engari	E. O'Sullivan and Sons, Tariki	4 6	314·1	353	8,430·5	436·90

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Four-year-old—contd.		Yrs. dys.	lb.		lb.	lb.
Sun Imp of Jersey Meadows	H. H. Phillips, Te Rehunga	4 355	349·0	323	7,541·8	433·79
Locksie of Jersey Meadows	H. H. Phillips, Te Rehunga	4 45	318·0	356	6,473·6	359·75
Robinia	R. C. Henry, Bell Block	4 326	346·1	339	5,928·3	356·63
Jerseydale Elsie's Beauty	T. H. Broomfield, Auroa	4 11	314·6	307	5,562·9	317·26
Mature.						
Lady Quickstep ..	Mrs. M. A. Gadsby, Stratford	9 30	350·0	365	10,499·4	701·30
Jim's Spot.. ..	H. B. Lepper, Lepperton	8 319	350·0	365	11,016·8	604·42
Tukapa Flora ..	Taranaki Hospital Board, New Ply'th	5 351	350·0	365	11,047·1	602·85
Mulberry	J. Nicholson, Manakau	9 14	350·0	365	12,474·5	602·02
Bronze	D. L. A. Astbury, Mangatoki	6 20	350·0	365	10,368·5	583·49
Rioter's Gavotte ..	W. A. Guy, Matapu ..	11 345	350·0	358	8,969·5	576·12
Waipiko Bell ..	A. H. Guy, Mangatoki	5 93	350·0	364	10,138·3	562·63
Kamo Bell ..	G. Hodgson, Whakapara	5 336	350·0	318	10,375·5	559·62
Princess Magnet ..	J. B. Laurenson, Hawera	11 300	350·0	365	9,650·2	558·23
Noble Girl.. ..	J. Nicholson, Manakau	5 334	350·0	365	10,729·2	553·81
Golden Sunshine ..	G. Hodgson, Whakapara	7 336	350·0	364	10,279·4	539·88
La Senta	H. J. Lancaster, Glen Oroua	6 4	350·0	365	9,718·2	535·65
Oakvale's Gin Gin ..	W. Mortlock, Normanby	5 58	350·0	365	10,170·4	526·65
Golden Sultana ..	K. M. Stevens, Maungatapere	6 66	350·0	365	8,573·9	522·88
Mangaoraka Kate ..	O. Glynn, Morrinsville	7 79	350·0	315	8,610·8	512·02
Genoese	E. O'Sullivan and Sons, Tariki	6 229	350·0	365	9,146·7	502·68
Viva of O. K. ..	A. H. Guy, Mangatoki	5 308	350·0	365	9,364·2	487·01
Queen of the Island..	J. Bones, Waihou ..	5 14	350·0	365	8,702·2	478·18
Passion's Darling ..	T. W. Perger, Brixton, Waitara	5 360	350·0	364	8,027·6	475·89
Pulchra's Favourite..	C. A. Care, Cambridge	7 30	350·0	303	8,074·5	429·25
Disdainful ..	W. H. Fitness, Rehia	7 10	350·0	347	7,176·9	421·06
Una's Zest ..	C. H. Sharp, Te Roti	6 76	350·0	238	6,306·3	381·49
Velvet	G. Buchanan, Paeroa	10 18	350·0	309	7,367·0	361·40
Rewa Blossom ..	J. Bones, Waihou ..	6 290	350·0	301	6,808·6	358·92
	AYRSHIRES.					
Two-year-old.						
Highland Mary of Heather Dells	A. M. Weir, Waitara	2 328	273·3	305	6,319·0	331·81
Mature.						
Fancy of Armadale ..	W. Hall, Lepperton ..	10 352	350·0	365	13,767·9	572·18
Marguerita III of Waipapa	F. Mills, Waipapa ..	6 313	350·0	336	12,716·4	550·84
Doreen of Waipapa..	F. Mills, Waipapa ..	8 216	350·0	365	14,687·5	542·66
Pretty of Waipapa ..	F. Mills, Waipapa ..	6 303	350·0	336	13,491·0	523·24

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
		MILKING SHORTHORNS.				
Senior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Dilworth Beauty III	A. J. McGovern, Kiokio	2 213	261·8	363	7,061·0	298·16
Dilworth Constance..	W. J. Law, Gordonton	2 297	270·2	295	7,554·0	284·01
Senior Three-year-old.						
Miss Massey A. ..	J. M. Whitham, Glenbrook	3 361	313·1	314	10,094·7	355·74
Mature.						
Glenthorpe Violet ..	A. J. Melville, Buckland	..	350·0	356	10,606·1	435·07
Sunnyside Princess Mary VIII	Sunnyside Mental Hospital	5 362	350·0	328	11,514·9	382·24
Sunnyside Pretty II	Sunnyside Mental Hospital	6 7	350·0	317	9,630·9	373·11
	Second-class Certificates.					
	FRIESIANS.					
Cluny Hope III ..	Cluny Friesian Farm Company, Wellington	4 318	345·3	323	15,972·8	595·85

INFORMATION ON SOIL-REQUIREMENT.

FARMERS and others desirous of ascertaining from the Department something of the requirements of their soils are requested to note that such information should in the first instance be sought through the Instructor in Agriculture or Fields Instructor for the district. In most cases he will be able to give all the information required regarding soil-treatment or manuring without sampling the soil. In some cases it may be desirable for him to take a sample for determination of the lime-requirement. In the absence of a soil survey of the district it is only in exceptional areas that an analysis will be of any use. As previously notified, it is specially requested that no sample be sent in to the Department's Chemist unless asked for. Experience has shown that where this has been done without advice the samples are quite inadequate or improperly collected, and the result is disappointing for all parties.

Meat-freezing Works in New Zealand.—The list of freezing-works published in the *Journal* for December last still holds good, there having been no additional works constructed since then, nor any material alterations made in killing or storage capacity.

Protection of Fruit-trees.—Painting the trunks of fruit-trees with lime-sulphur solution with a little tobacco-dust added is useful as a protection against hares and rabbits. A mixture of cow-dung, sand, and water is quite as good, and a little crude carbolic added improves it. Another mixture that gives good results for the purpose mentioned is Stockholm tar and mutton-fat. With fruit-trees trained to branch low, however, though the trunk may be protected, the danger of hares and rabbits reaching up and eating the young shoots is always present. The best precaution, therefore, is to enclose the orchard area with rabbit-proof wire netting, and shoot or trap as many of the vermin as possible. —*Horticulture Division.*

SEASONAL NOTES.

THE FARM.

FIELD CROPS AND PASTURES.

North Island.

WITH the excellent rains which have fallen in most districts pastures will now be producing their maximum of feed. The favourable conditions experienced, however, should not delude farmers: efforts should not be relaxed in providing for autumn and winter crops to supplement the pastures.

Hay and Ensilage Making.—Fields that were shut up at the usual time will be ready for cutting in December. For both hay and ensilage grasses are best cut when the majority of the plants are in bloom; if left later the stalk becomes woody, and the quality of the hay is greatly reduced. Another great advantage of early cutting is that the aftermath comes away fresh, and the fields get good covering before the very hot weather sets in.

Special hay crops, such as oats and tares or oats and peas, should be cut when the tares and peas are well out in blossom and the oats in the early milk stage. Where this class of crop is being grown for ensilage it may be left a little longer, the oats being best in the early dough stage, and the peas and tares just podding but not too hard. In deciding whether to make hay or ensilage the weather is a strong factor. If wet and broken, ensilage will be the better proposition, as this work can go on in spite of frequent rains—in fact, it is often an advantage to put the material in wet. Generally speaking, it is not much use trying to make stack ensilage with less than 30 tons of green material. It can, of course, be made, but the waste round the outsides is considerable compared with the amount of material saved.

The ensilage stack should be built as near square as possible. A fair crop of grass will run from 6 to 8 tons of green material to the acre. A stack to contain 25 to 40 tons should be approximately 14 ft. by 14 ft., or 50 to 70 tons, 16 ft. by 18 ft., afterwards allowing 5 superficial feet for every ton of green material. Thus a stack to hold 100 tons would require to be 24 ft. by 20 ft., and so on. It is best to raise the stack from 6 ft. to 8 ft. the first day, then allow it to stand for a day or two so that heat may generate up to about 130° F.; after this a few feet may be added each day. As the stack is being built, care should be taken to see that the sides and corners are kept well up and firm, so as to exclude the air; also, if the wind is blowing constantly from one direction a sheet or tarpaulin should be hung on the windy side, otherwise the heat will all be driven to the lee side and the stack will settle unevenly. It is also an advantage to add a pound or two of salt per ton when building—in fact, if the material is comparatively dry 4 lb. or 5 lb. per ton may be added with advantage.

The best results are obtained when a stack is built with a temperature ranging from 120° to 140°. If the stack becomes too heated the temperature may be controlled by adding more material; on the other hand, if too low, the stack should be allowed to stand for a day or two until the desired temperature is obtained. To test temperature, drive a 4 ft. length of 1 in. piping into the centre of the stack at the end of the day's work; an ordinary milk-thermometer attached to a piece of string is let down this pipe, and in the morning the temperature may be read. The pipe should always be removed before starting work, and put back in position at the end of the day. The majority of ensilage-stack builders do not bother about the thermometer, but it is a great help to the beginner.

Root Crops.—Mangolds and carrots should now be well up, and should be thinned out as soon as possible, and the land between the rows well cultivated to destroy weeds, encourage root-growth, and preserve moisture. Mangolds should be thinned to 1 ft. apart in the rows, carrots to 8 in.

Second sowings of soft turnips for cow-feeding should be made, Hardy and Imperial Green Globe being good varieties for this purpose. Turnips for late feeding to sheep or cattle should also be sown in December.

Swedes: Land set apart for swedes should be well worked up in December ready for planting just before or after Christmas, according to weather and other local conditions. It is essential to have good tilth and a clean seed-bed. Early cultivation, it need hardly be said, ensures moisture to give a good start to the seed and young crop—a very important consideration, among others, in combating the "fly." About 8 oz. to 10 oz. of seed put through every second coulter of the drill will sow an acre, together with basic super and an equal quantity of blood-and-bone, bonedust, powdered Nauru, or basic slag, according to soil conditions. On the light soils of fair quality equal parts of basic super and bonedust, at the rate of 2 to 3 or 4 cwt. per acre, are recommended. On soils of poorer quality blood-and-bone, and on moister and heavier soils, also peats, powdered Nauru or slag, is advised with the superphosphate.

Regarding varieties of swedes, naturally some diversity of opinion is met with. Garton's Superlative, Crimson King, Monarch, John Bull, and Magnum Bonum are approved varieties. Bell's Mervue, tried on two farms in the Ohura district last season, gave very satisfactory yields. Farmers should stick to the variety and strain of seed which have given satisfaction. In many districts during the last year or two the swede crop has been very subject to dry-rot, and nearly all varieties have been more or less affected. Some of the soundest varieties in the Wellington west coast and Taranaki districts last year were Up-to-date, Grandmaster, Caledonian, Incomparable, and Vilmorin's White Purple-top.

Provision should be made for a run-off paddock handy to the swede crop, thus securing roughage to help balance the roots.

Other Sowings.—The first week in December is a good time for sowing millet and maize, also lucerne. These crops were dealt with in last month's notes.

Harvesting.—Autumn-sown cereal crops will be ready to cut from the middle of December onwards, and farmers are advised to see that their implements are in good working-order, particularly the binder. It is bad business trying to have repairs made during the Christmas holidays.

South Island.

The month of December is essentially one of cultivation, as most of the sowings have been completed. During the early growth of most field crops at this season of the year the weed-growth is prolific, so that early and constant intercultivation is of paramount importance. November is frequently a dry month, and the grass-grub may cause considerable damage to crops. Where these conditions prevail it may be found necessary to resow such crops as Broadleafed Essex rape and Thousand-headed kale.

Turnips and Swedes.—Main-crop turnip and swede ground should receive the final working-up. Turnips suitable for sowing at this time for early feed are Red Paragon and Purple-top Mammoth. These, however, should be sown in limited quantity, as they do not possess the keeping-qualities of such varieties as Imperial Green Globe, Hardy Green Globe, Fosterton Hybrid, or Webb's Renown, all of which are well suited for main-crop purposes.

Grass-seed will be ready for cutting in December in most districts, and care should be taken to harvest when the seed is mature. Rye-grass and red-clover paddocks which have been closed for hay will be ready towards the end of the month.

Potatoes now require to be horse-hoed, and where necessary a second hilling of the crop should be given. Potatoes intended for seed purposes should be inspected at this season of the year, as differences in leaf-formation and flowers facilitate rogueing, and enable the grower to rogue impurities that could not easily be detected when picking over seed-potatoes. There is a growing demand for pure lines of seed-potatoes.

Lucerne sown in wide drills should receive frequent cultivation during the summer season, and, as the second cut in some cases will be ready in December, the harvesting or feeding-off should be followed with the cultivator. Stands that are not flourishing or are yellowish in colour should receive an application of ground burnt lime, or carbonate of lime in heavier application. This should be well worked into the soil, and some two or three weeks later inoculated soil at the

rate of 3 cwt. per acre applied. Land which is at all dirty and which is intended for lucerne must be frequently worked during dry weather in December and January, and sowings made at the end of January or during February, according to local conditions.

Farmers wishing to calculate the yield of lucerne when as hay in stack will find the following formula useful: Measuring the stack in feet, length × width × average height (assuming the pitched roof of the rectangular stack to be squared off) gives the content in cubic feet; this figure is converted into cubic yards by dividing by 27. When the stack is lightly settled about 20 cubic yards go to the ton, or, at the end of the season, when the stack is well settled, about 17 cubic yards. Hence, to convert the number of cubic yards in the stack into tons divide by 20 or 17, according to the time the hay has been in stack.

—*Agricultural Instruction Service.*

THE ORCHARD.

Merchants handling apples from different orchards notice a great difference in the samples of any one variety. Some are symmetrical in shape, smooth-skinned, firm in texture, and well flavoured. Such apples are known to keep well even under conditions that would destroy other samples of the same variety. These features in the apple, which may be summed up in the word "quality," are highly desirable; when attained they are a source of pleasure and profit to the grower, merchant, and consumer. It is well known to those accustomed to handling various samples that apples such as indicated usually come from orchards receiving proper seasonable cultivation, and rarely from those where the cultivation is started late in the spring or is left incomplete, the fruit probably being half-grown before a good tilth is obtained, to be shortly lost again by neglect. Such orchards often receive every other attention but this one of cultivation. While the samples from such a place may be clean, they are not in the same demand by discriminating buyers as are apples of quality.

As far as the crop is concerned, no orchard-cultivation at all results in a better sample of fruit than that obtained from an orchard in which the cultivation is imperfectly carried out. A wet spring is being experienced in some districts, and little cultivation can be done owing to the wet state of the ground, while weeds are growing apace. As soon as the weather really settles, a light cross-ploughing would be good treatment in many instances. At this season it is desirable that orchard land should be in good tilth up to the trunks of the trees.

Spray Treatment.—The trees will still need careful spray treatment, if only with arsenate of lead. Last year a grower with considerable codlin-moth infection in his orchard protested that he had sprayed a number of times with this compound. Inspection of the orchard log showed that five applications had been made, but, unfortunately, there had been an interval of six weeks between applications early in the season. To secure results applications of this spray must be well timed; where the moth pest is troublesome begin early, and make applications at intervals not longer than three weeks during the danger period.

It is usual to still combine a fungus mixture with the arsenate of lead for pip-fruit trees, although at a somewhat weaker strength—1 gallon of lime-sulphur (33° test) to 100 gallons of water being sufficiently strong. Where leaf-hopper or woolly aphis is troublesome a pint of Black Leaf 40 should be thoroughly diluted and included in the above spray. Use a slightly coarser nozzle on the spray gear at this season, and spray the inside of the tree as well as the outside, getting the mixture well into the fruit-clusters so that the fruits are covered all over. To avoid mildew the young growth will also need a coating.

Where the stone-fruit crop has set it should receive careful attention. Thin, if necessary, so that it is readily cleansed by spray, &c. Lime-sulphur, as recommended last month, should be applied at intervals up to within a fortnight of picking.

Sometimes green aphis shows up rather badly in the peach and nectarine breaks. Where neglected, this pest seriously endangers the life of the trees, even when they are in their prime. As soon as this insect is seen spray the trees thoroughly with Black Leaf 40, 1–800, being careful to add 3 lb. or 4 lb. of dissolved soap to the 100 gallons of water before the nicotine is added. Owing

to the habit of these insects secreting themselves in the curled edges of the young leaves many will escape the first application, which should be repeated after about a week.

The stone-fruit harvest is about to commence, and owing to its perishable nature requires careful consideration. Is it for dessert or culinary purposes, for the retail trade, or the factory? Each class of demand needs special catering. Stone-fruit commonly ripens unevenly, and so needs careful picking; usually, while plainly showing signs of maturity, it should still be perfectly firm when picked for commercial purposes. A box of stone-fruit of uneven maturity is very disappointing. Fruits that have commenced to soften should not be shipped with firm fruit, while fruit that is immature must be left on the tree. It is worth while sizing the larger kinds of stone-fruit before packing.

Removing Large Limbs.—It is an all-too-common experience, unfortunately, to have to remove large limbs from orchard-trees—especially cherry, apricot, and peach trees—because of silver-blight or some species of die-back. To say the cut should be carefully dressed with tar or paint is a horticultural platitude, but the astonishing fact is that such a dressing is rarely given. A fine fruitful block of apricot-trees in their prime, inspected recently, was found to have a number of gaps in its ranks made by the attack of wound parasites—an attack that would have been harmless had the larger wounds been properly dressed with tar.

—*W. C. Hyde, Orchard Instructor, Nelson.*

CITRUS FRUITS.

The oil spray for control of various scale insects, thrip, and aphis should have been applied in the late spring, when the sap had risen and young growth had set in. In cases, however, where this spray has been omitted it can safely be applied in early December, using 1–40 strength. In connection with the red-oil spraying of this class of fruit-tree it is very noticeable in most citrus-orchards that sufficient care is not always exercised in making the application. The most important portion of the tree—that is, the under-part of the leaves—is almost invariably left unsprayed by some growers. It is advisable to use a spray-gun wherever possible in such cases. Considerable defoliation has been caused in some localities by the use of red oil, but in many instances this is entirely due to the presence of free oil in the mixture. Soft water should always be used to emulsify.

By the first week in December the blossom-petals will have practically all fallen, and most growers will have taken the precaution of putting on the most important application of 4–4–40 bordeaux for control of fungoid diseases, including citrus-verrucosis, wither-tip, &c. The application should be repeated one month later if scab or brown-rot is prevalent in the grove.

Any lack of vigour in a citrus-tree will be most easily discernible at this season, and every endeavour should be made to determine the reason for the sickly appearance of any such tree. If the trouble is bark-blotch the special treatment already detailed in the *Journal* for May last should be applied.

FIREBLIGHT.

Infection from this bacterial disease has again made its appearance in the suburbs of Auckland. This, of course, was not unexpected, as hawthorn has been allowed to remain growing in those particular localities. Where, however, this plant has been properly treated—cut out, or at least cut down—and fireblight infection in orchard-trees methodically and thoroughly treated by removal and destruction by burning, there has been no infection so far this season.

From the commencement of December the second infection—namely, early tip-infection—may be looked for in apples. Any blossom-infection in pears, apples, or quinces should have made itself manifest by the end of November, and it is safe to presume that orchards free from infection at that time are past the greatest danger. It must be remembered, however, that tip-infection may make its appearance at any time up to and including March.

Throughout the Dominion orchardists generally are no doubt on the alert and are continually watchful. One and all are urged to remain so throughout the season, and to treat with suspicion even the most minor infection of pip-fruit trees not definitely known to them, and report the same immediately to the local Orchard Instructor. Although it is very wise to pursue the course of cutting away at the moment and burning any parts of a tree showing suspicious symptoms, growers are requested to obtain the opinion of the Instructor wherever possible, in order that the Department may keep fully in touch with the spread of the disease.

For the benefit of those growers who have not already made themselves conversant with the procedure advised in the event of infection from fireblight being identified, detailed information is repeated as follows :—

Where present, fireblight causes severe loss to growers, as when flower-buds are infected no fruit sets, and the grower loses the present and also subsequent crops, for the spurs or fruit-buds are invariably killed outright. From these spurs the disease spreads into the laterals and main branches, forming cankers which spread and, if not checked, kill the branches outright. A number of such cankers would in one season kill many years' fruiting-wood, and neglect of the cankered areas would mean the death of all infected trees within a season or two.

The most effective remedial measures lie in the immediate removal of all infected areas and destruction of the original source of infection, so that a recurrence of the trouble may be prevented. It is advisable that an early start be made with the work of removal, as at present the diseased areas are plainly noticeable, whereas in the winter months they are difficult and in many cases impossible to locate. Control measures consist in removal of the diseased portions of infected trees. Lateral shoots should be cut some inches below the cankers; on larger branches the cankers and all discoloured tissue must be removed with a sharp knife. The wounds should then be sterilized with a corrosive-sublimate solution, and painted over with coal-tar. It is important that all instruments used—secateurs, knives, &c.—should be sterilized after each cut. This is necessary so that these instruments will not spread infection. For sterilizing instruments use a formalin solution. All diseased laterals, cankered portions, &c., should be immediately burned, for if they are allowed to lie about they will be the source of further infection both now and in the following spring.

For sterilizing knives, secateurs, &c., use a solution of 1 part formalin to 20 parts water, which should be mixed and kept in a convenient wide-mouthed receptacle so that the instruments may be dipped in. Quick immersion will be sufficient to kill any organism likely to be present. For disinfecting areas on the trees that have been cut, use 1 part corrosive sublimate to 1,000 parts water (equal to 1 tabloid to 1 pint of water), applying with a small brush. This is a deadly poisonous compound, and should not be left lying about. As metals decompose this compound it should be kept in a glass or earthenware receptacle —not in a tin—and knives or secateurs should not be dipped into it. As a wound covering after sterilization with corrosive sublimate use pure coal-tar, applied with a stiff brush. It is practically harmless to the tree, and when coated on the wound prevents the entry of parasitic fungi.

Above all, in areas where infection is known to exist cut out all hawthorn, and in other districts watch it carefully.

—J. W. Collard, Orchard Instructor, Auckland.

POULTRY-KEEPING.

Although hatching is now over for the season, December will prove a busy time for the poultry-keeper, from the fact that the maximum amount of stock the plant will carry should be on hand. This implies the necessity of taking special care that the quarters do not become overcrowded. The first thing necessary is the feeding and managing of all surplus cockerels to the best advantage, and getting rid of them immediately they attain an age of from four and a half to five months. After this age they commence to produce their second feathers, and, obviously, when this process commences they lose weight instead of gaining it, as they cannot be expected to produce flesh and feathers at the same time. It is surprising how much flesh chickens will put on prior to the appearance of the second feathers if they have never received a check and are fed well and maintained in a healthy thriving state, and it is equally surprising how rapidly they will lose condition when the second feathers commence to appear. The check during the development of the new covering is due not so much to the sudden and new demand on the bird's system as to the fact that at this age, and especially in the lighter breeds, it will commence to indicate the propensities of nature's development, even when the cockerels are running by themselves, by sparring and fighting and generally taking considerable exercise. All this is against flesh-production. Therefore if any money is to be made out of the cockerel it must be marketed in prime condition before the second-feather

period. A point to be remembered in marketing cockerels early is that accommodation and runs are saved, which is distinctly to the advantage of the remaining stock, while more time is available to attend to the main function of the plant.

Ovarian Troubles.—Many complaints are reaching me of ovarian troubles, chiefly by way of protrusion of the oviduct. This is usually due to overfeeding rich foodstuffs. A bird does not require the same amount of forcing-food in the present natural laying season as she does in winter when egg-production is more or less an artificial act. Blood or meat meal, meat, or even milk, should be sparingly supplied now, especially where the birds have a range and thus an opportunity, especially after rain, of picking up worms, insects, &c. When forced egg-production is resorted to at this season of the year ovarian troubles and double-yolked and shell-less eggs are almost sure to follow.

A Chicken Trouble.—Many poultry-keepers are having trouble with their chickens after removal from the heated brooder. The first symptoms are discoloration of the wings and hock-joints, and later the neck and head swell. At the latter stage death is usually not far off. Commonly when this trouble makes its appearance poultry-keepers confuse it with some serious epidemic form of disease over which they have no control. There is no epidemic about it; the cause—in all cases, at any rate, which have come under my notice—has been mismanagement. It may be easily brought about by overcrowding, damp quarters, and insufficient ventilation. A most common cause of the trouble is bedding the chickens down with hay, which heats and brings on a sweated condition. Hay may be used as bedding-material in a heated brooder, because it is there prevented from becoming damp, but with a fireless brooder it should never be used, or trouble may be expected at any time. Straw, straw-chaff, or even sand or dry earth are always to be preferred. There is no cure for the trouble referred to. It is merely a question of prevention. Do not overcrowd, provide ample ventilation, keep the quarters clean and dry, and check anything that tends to create a moist atmosphere.

MARKETING OF EGGS.

If a record could be obtained of the loss in money value through weak methods of marketing the egg-product it would probably run into startling figures. One has only to visit an egg-collecting depot to be made familiar with the weaknesses of marketing. For example, a surprising number of poultry-keepers, and especially those who conduct the business as a side-line, still adhere to the antiquated method of sending their eggs to market in kerosene-cases packed with straw-chaff. Such eggs usually realize from 1d. to 2d. a dozen below those packed in approved crates, but this seems to be viewed as a matter of small concern by the careless producer.

With the present system of pulping and freezing the great bulk of the summer surplus of eggs for the use of large consumers during the scarce season, eggs packed in chaff are practically useless for this purpose, because it is next to impossible to keep the chaff out of the pulp. Especially is this the case where a number of eggs reach the pulping-depot in a broken condition, when the chaff adheres not only to the broken eggs but the sound ones as well. Such eggs present an unsightly, sticky mass, and consequently the commercial value of the whole line is reduced. The other day I witnessed at an egg-circle depot a chaff-packed line of eggs being opened up and reconditioned. Many of the eggs were badly broken. The circle agent was being paid at the rate of about 5 per cent. for handling and marketing the eggs. The work of separating the sound eggs from the broken ones and then washing the former was worth more money than the commission charged, without having to sell them in addition. Complaints have recently reached me regarding egg-pulp containing a quantity of chaff. This is to be regretted, as if it continues it may have a far-reaching and bad effect on the industry as a whole. Eggs which have been packed in chaff should never be used for pulping purposes, and egg circles should let it be known at once that such eggs will not be received under any circumstances. Up-to-date wire egg-carriers are now obtainable in various sizes at a moderate cost, also cardboard fillings to fit a kerosene-case.

The present low price of eggs seems to indicate that we are on the eve of the supply exceeding the demand and that an oversea market must be sought. It is important to pack only guaranteed fresh, clean eggs for the local market if the highest price is to be secured and a valuable connection established, but it is even more essential that these details should be strictly observed for an oversea trade. Further, the eggs should be infertile, they should be uniform in size and colour,

and should in every way appeal to the consumer abroad as being a choice and reliable product. It should be always remembered that (as with any exported foodstuff) if a good impression is first created on the market good business will generally attend subsequent supplies. On the other hand, if unsatisfactory initial shipments are made, a good name thus lost is very hard to regain.

In due course the question of export must be seriously considered, having regard to the great development in poultry that is taking place. Before this comes about, however, the first essential is to do all possible to create locally a keener demand for eggs. This can be achieved only by supplying the consuming public with a better quality of eggs than ever before. Not only the producer but the selling agents and the retailers as well can all assist in this direction. In the first place, the producer should see that good clean nests are provided. Dirty nests mean dirty eggs, and washed eggs never have the same bloom as clean unwashed ones; moreover, washing eggs is slow work, while many are broken in the process. In addition to being absolutely clean they should be graded according to size, recognizing that anything under 2 oz. is not really a first-grade article. The colours should also be kept separate, and the eggs marketed as often as possible, in special crates made for the purpose. Then the male birds should be removed from the flock as soon as the breeding season is over, so that only infertile eggs will be marketed. Further, make sure that only stock are bred from that will produce progeny which will lay the bulk of first-grade, good-sized, marketable eggs, instead of the all-too-common small egg of to-day. In view of egg-pulp being sold by the pound, the time must surely come when eggs intended for this purpose will be bought by weight instead of by the dozen. Under the present system the producer has little inducement to breed flocks laying heavy-weight eggs.

Then, if the desired reform is to be brought about, the selling agents and the retailers must amend their system. In the first place, they should establish a special brand carrying a guarantee of quality. So long as all grades are sold as just eggs the desired end will never be reached. Even the consumer can assist in the object aimed at by demanding new-laid eggs of good size and colour, and by returning to the retailer and demanding restitution for all bad eggs supplied. During the past few years poultry-keeping has made rapid strides in the Dominion, but the maximum returns will never be secured from the industry until the marketing side of it is placed on a more sound footing. The chief responsibility in this connection lies with the producer. First, he should produce and send to market nothing but fresh, clean eggs. Then, by means of a sound marketing organization among poultrymen, the eggs should not only reach the consumer in a similar condition, but also at the lowest possible cost of handling.

—*F. C. Brown, Chief Poultry Instructor.*

THE APIARY.

With the advent of December all danger of the bees dying of starvation should be over. If the bees have received the required attention work should have progressed in the first super, and some of the stronger colonies may require even more room. Where excluders are not being used the queen, if young and vigorous, will probably be making use of at least three of the centre combs in the super. This is no cause for regret; it is rather a good sign, provided the combs in the brood-chamber are fully occupied with brood. A good young queen requires more laying-room than is provided in a ten-frame brood-chamber. On this account excluders cannot be recommended. If it is desired to use excluders to ensure that all combs in the super are free from brood at extracting-time that objective can be attained by inserting the excluders a month before it is proposed to extract. By that time the swarming season will be practically over, and, as the queen will not be laying quite as freely, less room will be required for brood.

SWARM-CONTROL.

The putting-on of the first super will have checked the first impulse to swarm, but difficulties in this connection are not over, and further measures will be necessary. Various schemes have been introduced from time to time to control swarming, and some of them have received considerable support even from commercial beekeepers. The method adopted must be largely determined

by local conditions. The bees require considerably less attention in districts favoured with a light or medium honey-flow extending from November to March. In some parts of the Dominion the flow is confined to a few weeks from mid-December to the middle of February at the longest, and the flow during that time is very erratic. Sometimes the nectar is coming in so fast that the bees appear to become frantic in their endeavours to find room for it. Every available cell is filled, with the result that the queen is restricted in her laying and the swarming impulse engendered. If every colony is headed by a young queen swarm-control is then simply a matter of providing plenty of room for the use of the queen and the storage of honey, and ventilation.

The method adopted successfully by some beekeepers, and known as the Demaree system, consists in lifting the brood, with the exception of one frame containing open brood and the queen, over an excluder. This plan is open to very serious objection, owing to the fact that too large a proportion of the bees go into the super and remain on the brood. The combs in the brood-chamber are not cleaned up or the foundation drawn out for the use of the queen, with the result that her laying is restricted for some time to the one comb. This difficulty can be overcome very largely by placing a super of empty combs immediately over the brood-chamber, and the brood as a second story on top. Queen-cells will be started on the brood, and, if it is desired, the opportunity can be taken to requeen the colony. If a hole is bored at the back of the super the young queen will be able to fly to meet the drones, and in due course start laying. The old queen in the brood-chamber below can then be killed and the young queen substituted.

Many commercial beekeepers control swarming adequately by simply drawing the bees up into further supers. When the first super is about three parts full lift it off, and put the new super containing drawn combs or frames fitted with foundation and one frame of brood taken from the brood-chamber or from the centre of the first super in its place. Then place the first super on top. When this new super is about three parts full put on still another super immediately over the brood-chamber, fitted as recommended in the case of the first two supers. It is possible to still further extend the colony if it requires more room, but it would be better to extract the honey from some of the combs and return the empty combs. The writer has known one colony to bring in eleven supers full of honey in the season. It was worked as a four-story colony, the honey having been taken off as fast as it was sealed, and the empty combs returned.

ARTIFICIAL INCREASE.

This is accomplished by simply dividing established colonies and furnishing each queenless portion with a ripe queen-cell or, preferably, a laying-queen. If a maximum of increase is desired irrespective of a crop of honey, each colony can be divided to form a number of nucleus colonies each containing two frames of brood and one empty comb. Each division, with the exception of the portion remaining on the site of the old hive, should be shut up for three days, otherwise practically the whole of the field-bees will forsake the newly formed nuclei and return to the site of the old colony. Do not unduly confine a young laying-queen to a limited number of frames, but give the additional combs when required. A queen-bee ages prematurely if prevented from functioning naturally.

FOUL-BROOD.

Every colony affected with this serious disease should be treated immediately the honey-flow commences. Approved treatment consists in shaking all the bees on to frames containing a narrow strip of foundation, and four days later brushing them from the pieces of comb they have built, on to frames fitted with full sheets of foundation. If there are a number of colonies to be treated the brood can be placed over an excluder put on one of the weaker colonies, and, when all the brood has hatched out, treated in the usual way. The combs, if not too badly infected, may be melted into wax, and the frames sterilized by immersion for a few minutes in boiling water and used again. The utmost care, however, must be exercised to keep all infected material out of the way of the bees. Section 3 of the Apiaries Act provides that "every beekeeper in whose apiary any disease appears shall, within seven days after first becoming aware of its presence, send written notice thereof to any Inspector appointed under this Act."

—H. W. Gilling, Apiary Instructor.

THE GARDEN.

VEGETABLE-CULTURE.

In the cooler districts sowing for winter crops will have started in October, brussels sprouts and early broccoli being the first sown. These would be followed by cabbages, savoys, mid-season and late broccoli, and kale, early in November. In middle districts the fourth week in November is early enough to sow, all varieties being sown at the same time. The exceptions are a few inland situations where the winters are similar to those experienced in the far South, and in such places an earlier start is necessary. It may appear wrong to sow early, mid-season, and late varieties of broccoli at the same time. The explanation is that some varieties are longer in coming to head than others. The early varieties come quickest, mid-season take a longer time, and late varieties longer still. Therefore, though all may be started together, they will not come in together. In most middle districts growth is strong during midsummer and early autumn, and continues through winter, though, of course, more slowly. When the seeds are sown near the end of November strong plants are ready for setting out during the first two or three weeks of the new year. Experience has shown that sowing and planting at the times stated provide savoys and cabbages for winter use, give brussels sprouts time to develop, and ensure that all the broccoli come in well developed in the order of succession. Planting a month later has resulted in very partial success or in failure.

Tomatoes: In the earliest districts fruit is well forward; in other places the plants are only now getting a start after planting. Superfluous shoots should be pinched out while quite small, for if allowed to extend they result in wasted energy. Spraying is in many cases not done until blight appears. Some districts have little or no trouble from blights that can be controlled by spraying, but experience teaches where it is likely to occur, and in such places it is wise to spray as a preventive immediately after rain. Copper solutions are most effectual, the most useful formula being bluestone 4 lb., washing-soda 6 lb., and water 40 gallons.

Celery: Self-blanching varieties are most useful for early supplies. These may be planted on the flat, which is, in fact, the most general plan at the present time. The plants are set about 8 in. apart in beds 5 ft. to 6 ft. wide. The soil must be rich, and water should be supplied if it becomes dry. If the plants make good growth they will shade each other and so be sufficiently blanched to render them fit for use. Such heads are, however, a poor substitute for good celery, though they find a ready market. Self-blanching varieties are not suitable for any but early crops except in the warmer districts, being tender and unable to bear cold weather. The finest heads are obtained from trench-grown plants, but even then they are not equal to those produced by the varieties that are not self-blanching, these being more robust and capable of making larger heads of a better quality. In the cooler districts celery is rarely attacked by disease, but the contrary is the case in the warmer districts, where rust and leaf-spot are common troubles. Spraying with 2–2–40 bordeaux can generally overcome the disease, but it must begin with the seedlings as soon as they are well above ground, and be repeated about every twelve days till the plants are fully grown. A small louse is a frequent cause of trouble, and is not confined to the warmer districts, though more frequent in such places, where it also attacks young carrots and parsnips. The insects are easily destroyed by spraying with a suitable insecticide, such as Katakilla.

—*W. H. Taylor, Horticulturist.*

Lucerne-culture.—The marked increase in lucerne-growing in certain extensive parts of the North Island is shown by a compilation of the quantities of lucerne-seed sold by the leading local seedsmen, made by Mr. J. W. Deem, Fields Instructor, covering his several districts. The amounts are as follows, the sales for 1921–22 being given first and those for 1920–21 in brackets: Taranaki and Wanganui-Palmerston North, 34,428 lb. (23,643 lb.); Hawke's Bay, 25,921 lb. (18,110 lb.); Gisborne, 18,000 lb. (11,160 lb.).

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

MORTALITY IN LAMBS AFTER DOCKING.

"TAWA," Takapau :—

About a week after docking a number of lambs in one of my paddocks showed signs of lameness, mostly in all four legs. Five died, but the others are recovering. A post-mortem examination showed empty intestines, and stomachs containing some very hard curd, some wool, and also earth and sand—in one case there was quite a tablespoonful of sand. The wounds from docking appeared healthy. The docking was done in old yards, but in former years I have not had any losses. I shall be glad of advice.

The Live-stock Division :—

We are of opinion that the cause of the mortality was septic poisoning, and we would advise you to abandon the present yard altogether and erect a new one elsewhere. If this cannot be done, dig up and remove the earth in the yard to a depth of 6 in. or 8 in., mixing it thoroughly with quicklime where it is deposited. Thoroughly disinfect all posts and rails with a strong, hot solution of some reliable disinfectant. In future operations see that all instruments used in either docking or castration, as well as the operator's hands, are thoroughly clean. Boil instruments before and after use. Frequently immerse the hands in a solution of disinfectant during operations. The sand, &c., found in the stomach of the dead lambs may be accounted for by the fact that animals in a high fever in pain will frequently bite the ground.

BROWN AND BRONZE BEETLE IN ORCHARDS.

Mrs. H. J. SQUIRE, Rapaura, Blenheim :—

Every year the brown beetle attacks my peach-trees and eats all the leaves off, and later on the young fruit falls off. Could you advise me what to do, or what I could spray them with ?

The Horticulture Division :—

Both the brown beetle (*Odontria zealandica*) and the bronze beetle (*Eucolaspis brunneus*) are extremely difficult pests to deal with, because it takes a good deal of poison to kill them. Peach-trees are very susceptible to spray injury, so that a strong spray is out of the question. In large orchards frequent cultivation will bring the grubs to the surface and cause their destruction, and will prevent beetles harbouring in the soil, so that attacks will be from the outside and usually confined to the outer row of trees. Where there are only a few trees control is possible if energetic action is taken. The brown beetles appear soon after dusk in the evening, and that is the time to attack them. The beetles should be allowed to settle on the trees, then if the trees are shaken the beetles will fall to the ground. A sheet of canvas should be spread to catch them. They can then be thrown on to a fire or into a tub of water with a little kerosene floating on the top. By adopting this plan the beetles are captured before doing damage. Spraying will bring most of the beetles down. A trial of the following solution is advised : Soak 1½ lb. of quassia-chips in 2 gallons of water for twenty-four hours, then bring to the boil and allow to simmer for half an hour. Strain and mix the decoction with 10 gallons of water, to which has been added 1 lb. of soft-soap dissolved in hot water. This mixture has been successfully employed against plant-bugs. It is not poisonous to man, but is fatal to the lower animals. It will embitter the foliage and may to some extent act as a deterrent.

STRAWBERRY AND SUBTERRANEAN CLOVER.

E. C. B., Ongaonga :—

Can you tell me the feeding-value and characteristics of strawberry and subteranean clover ?

The Agricultural Instruction Service :—

Strawberry clover (*Trifolium fragerum*) is much like white clover in growth and habit, except that the leaves are a true oval in shape. Its feeding-value is much about the same as that of white clover. It thrives best in moist places, particularly low-lying flats near the sea. Subterranean clover (*Trifolium subterraneum*) is a small prostrate annual clover ; the flowers are white or pale pink. After flowering, the flower-stalks turn down and press into the soil, where the seeds germinate. It produces feed in the spring, and is useful for filling up the bottom of pastures, particularly on dry land where the sole is naturally thin.

CONTROL OF RAGWORT.

D. S. Davidson, Orewa :—

Could you advise me as to the best method of getting rid of ragwort ? The land on which it is growing is heavily timbered and cannot as yet be ploughed.

The Live-stock Division (Noxious Weeds Inspection) :—

When only small patches of ragwort have to be dealt with the plants can be destroyed by heavy spraying with one of the proprietary weed-destroyers on the market. Where the weed is too plentiful for this method it can be kept under by stocking with sheep, provided the land is sufficiently improved to enable it to be stocked to its full carrying-capacity. Sheep eat the ragwort freely, but cattle will not do so.

CULTURE OF LOGANBERRIES.

A. B., Palmerston, Otago :—

Please tell me how to proceed with loganberries this season and next. They have been grown from rooted slips against a netted enclosure, and can later be protected from birds.

The Horticulture Division :—

The strong rods that are developing this season will bear fruit next season. The usual custom is to renew the rods every year. The fruiting-canes should be cut out as soon as the crop is gathered, new rods being laid in to take their place. It is necessary to allow each year the growth of a sufficient number of young rods to replace those of the previous year. The rods may be trained fan-like against a wall or tall fence, or on a trellis formed of posts and two wires, the top wire being about 4 ft. 6 in. from the ground and the other half-way down. An improvement on this form of trellis is to use four wires instead of two, the wires being placed in parallel pairs and separated by pieces of timber 10 in. long nailed to each post.

TROUBLE IN COWS ON SWEDES.

"Inquirer," Rotorua :—

I have had quite a number of calves born dead this year, mostly from heifers. My cattle have been running on swedes for several months (6/10/22), and are in good condition. The calves are large and well developed. Could you tell me the cause and remedy ?

The Live-stock Division :—

You do not state under what conditions the turnips were fed to the cows. If a herd of cows is fed solely on turnips digestive troubles are sure to follow. These are detrimental alike to the cows and to the offspring which they are carrying. When the herd is put on turnips they should have a run-off, and a liberal quantity

of good hay fed to them. All cows coming to profit should be taken off turnips and placed on a clean grass-paddock at least a fortnight to three weeks before calving.

TOP-DRESSING WITH SUPERPHOSPHATE AND LIME.

"DAIRY-FARMER," Ramarama, Auckland :—

For some years past I have used a mixture of lime and super as a top-dressing with fairly satisfactory results. My land is deficient in lime, and to make up the deficiency I have been using mixtures varying from 1 in 3 to 1 in 5 of super with lime, and sowing sufficient of this to give up to about 2 cwt. super to the acre. I would like to know if I am getting the best value out of the super, or if the larger quantity of lime detracts value from it. Would a dressing of 5 cwt. or 6 cwt. of lime, followed by 2 cwt. of super later on, give better results ?

The Agricultural Instruction Branch :—

If your land is deficient in lime, as you have stated, a mixture of superphosphate and lime would give you better results when applied to pasture than super alone. 2 cwt. of super per acre each year, in conjunction with lime, is a moderate dressing. The larger quantity of lime that you mention would not in any way detract from the value of the super ; on the other hand, it would increase its effectiveness in the soil. Putting on a dressing of lime in the autumn, followed by super in the spring, is good practice, and is to be recommended if heavy dressings of lime, such as 15–20 cwt. per acre, are applied. In your case, where you are applying small quantities, you should continue to apply the lime and super simultaneously, because this will save expense in labour.

RABBIT-CONTROL IN THE HURUNUI DISTRICT.

THE following regulations under the Rabbit Nuisance Amendment Act, 1920, relating to the destruction of rabbits in the Hurunui Rabbit District, North Canterbury, are of special interest as being the first measure of the kind taken in the Dominion to control trapping :—

1. Notwithstanding any other means adopted by him, every owner of land on whom a notice to destroy rabbits is served in terms of section 6 of the Rabbit Nuisance Act, 1908, shall adopt one or more of the following means of destroying rabbits—namely, the laying of poison, the fumigation of burrows, the filling-in of burrows : Provided that if an owner is of opinion that none of the principal means prescribed is the most suitable in his case he may apply to the Board for permission to use some other means, and the decision of the Board shall be final as to the means to be adopted.

2. Not later than seven days after the service of such notice on an owner of land all trapping on his land shall cease, and thereafter for a period of three months from the date of service of the notice the owner shall not, except with the written permission of the Board and subject to the conditions specified therein, trap rabbits or allow rabbits to be trapped on his land.

3. Every person committing a breach of these regulations shall be liable to a fine not exceeding £10.

The regulations were gazetted on 19th October, and came into force on 1st November.

Correction.—In the notes on the Gore Experimental Area, printed earlier in this issue, the third and subsequent sentences of the second paragraph of page 279 should read as follows: The average dairy cow requires approximately 11 feed-units daily for maintaining herself and also for the production of the average supply of butterfat. To supply this number of feed-units 24½ lb. of lucerne hay would be required daily, and, as a matter of fact, this is the usual amount consumed daily by the milking-cow. The amount of turnips required to supply 11 feed-units is approximately 154 lb., and this in no way taxes the animal's digestive system.

WEATHER RECORDS.

OCTOBER, 1922.

THE following general summary and rainfall statistics are supplied to the *Journal* by the Director of the Dominion Meteorological Office (Mr. D. C. Bates) :—

The outstanding feature of the weather for the month of October was the prevalence of westerly disturbances, which, while accounting for copious downpours on the west coast, particularly of the South Island, caused not only a deficient rainfall in the east coast but a trying lack of moisture, and heavy northwesters also at times, doing considerable damage. The contrast afforded in the tables is interesting—Hokitika with its 17·58 in. on the one side of the Southern Alps, and Christchurch on the other with only 0·45 in. Farther south, again, Okuru had 18·18 in. against Fairlie's 0·26 in. and Timaru's 0·64 in. Another dominating feature in weather controls was the absence of ex-tropical cyclones—though the stormy edges of two at least touched and passed in the far North, and for this reason the rainfalls north of Auckland are above the average. Nelson had also more rain than usual—1·88 in. falling upon one day, which is more than half the local mean for the month of October, and falls on ten other days brought the total up to 6·24 in. This was owing to the prevalent northerly winds and the northerly aspect of that place.

The month opened dry and fine everywhere, but warm and humid conditions were shortly followed by heavy west-coast rains and cloudy and unsettled weather generally. Rain fell in many parts at the end of the first week, though sultry conditions continued on the east coast. Barometric pressure was very low in the south on the 14th at 9 a.m., but rose rapidly in the next thirty-six hours, and some snow fell on higher levels about this time. The weather was then very stormy in the southern districts. A day or two of more settled weather followed, but the westerlies again asserted themselves, and the close of the month was dominated by an intense storm area. To vary a familiar phrase used to describe that fickle jade, the weather—the month came in like a lamb but went out like a lion.

RAINFALL FOR OCTOBER, 1922

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	8·00	13	2·24	4·48
Russell	4·84	12	1·54	3·27
Auckland	4·04	19	1·25	3·62
Tairua, Thames	4·16	13	1·40	6·89
Tauranga	4·16	17	1·52	5·36
Kawhia	4·98	18	1·16	5·28
Marachako Station, Opotiki ..	5·20	10	1·48	5·50
Hamilton	3·55	18	0·86	4·82
Taupo	3·94	14	0·88	4·28
Gisborne	0·82	8	0·19	2·84
New Plymouth	7·19	18	1·48	5·47
Inglewood	11·24	19	3·20	10 09
Whangamomona	8·42	16	2·20	9·11
Taihape	2·88	15	0·78	4·30
Greenmeadows, Napier	1·14	12	0·22	2·30
Patea	3·07	16	1·14	4·11
Wanganui	2·68	7	0·73	3·65
Masterton	0·89	12	0·19	3·34
Foxton	2·59	8	1·16	3·07
Wellington	2·33	13	0·65	4·15

RAINFALL FOR OCTOBER—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average October Rainfall.
South Island.				
	Inches.		Inches.	Inches.
Collingwood	11·82	18	2·71	11·03
Nelson	6·24	11	1·88	3·41
Spring Creek, Blenheim	2·96	18	0·76	2·39
Waiau	1·42	7	0·60	2·02
Westport	7·98	23	0·96	6·97
Tophouse	6·07	24	0·80	5·80
Greymouth	10·78	24	1·26	10·66
Hokitika	17·58	25	2·54	11·74
Hanmer Springs	1·32	6	0·50	2·66
Gore Bay, North Canterbury ..	1·14	8	0·32	1·80
Arthur's Pass	30·01	21	5·03	20·99
Christchurch	0·45	9	0·15	1·65
Lambrook Station, Fairlie ..	0·26	4	0·12	2·00
Okuru, Westland .. .	18·18	18	2·86	15·37
Timaru	0·64	7	0·14	1·97
Oamaru	1·97	6	1·50	1·66
Benmore Station, Omarama ..	1·28	12	0·26	2·09
Queenstown	1·61	10	0·58	3·60
Clyde	0·22	5	0·80	1·58
Dunedin	1·76	13	..	3·05
Gore	2·70	15	0·62	3·35
Invercargill	3·54	19	0·72	4·61

FORTHCOMING AGRICULTURAL SHOWS.

Otago A. and P. Society: Dunedin, 29th and 30th November.
Auckland Metropolitan A. and P. Association: Auckland, 1st and 2nd December.
Hauraki A. and P. Association: Paeroa, 6th and 7th December.
Southland A. and P. Association: Invercargill, 12th and 13th December.
Tuapeka Agricultural Society: Lawrence, 26th December.
Wairoa County A. and P. Society: Wairoa, 17th January.
Woodville A. and P. Association: Woodville, 23rd and 24th January.
Helensville A. and P. Association: Helensville, 29th January.
Pahiatua A. and P. Association: Pahiatua, 9th February.
Te Puke A. and P. Association: Te Puke, 9th February.
Northern Wairoa A. and P. Association: Mititai, 9th and 10th February.
Clevedon A. and P. Association: Clevedon, 10th February.
Rodney Agricultural Society: Warkworth, 10th February.
Dannevirke A. and P. Association: Dannevirke, 14th and 15th February.
Waimarino A., P., H., and I. Association: Raetihi, 15th February.
Wellsford A. and P. Society: Wellsford, 16th February.
Masterton A. and P. Association: Masterton, 20th and 21st February.
Te Awamutu A. and P. Association: Te Awamutu, 21st February.
Omaha and Pakiri A. and H. Association: Leigh, 21st February.
Rangitikei A. and P. Association: Taihape, 22nd February.
Opotiki A. and P. Association: Opotiki, 23rd February.
Franklin A. and P. Society: Pukekohe, 23rd and 24th February.
Rotorua A. and P. Association: Rotorua, 28th February.
Katikati A. and P. Society: Katikati, 1st March.
Morrinsville A., P., and H Society: Morrinsville, 14th March.
Methven A. and P. Association: Methven, 15th March.
Temuka and Geraldine A. and P. Association: Temuka, 22nd March.
Matamata A. and P. Association: Matamata, 22nd March.

(Agricultural and Pastoral Association secretaries are invited to supply dates and location of their shows.)

DAIRY INDUSTRY AMENDMENT ACT, 1922.

THE text of this measure, as finally enacted in the recently closed session of Parliament, is as follows:—

1. This Act may be cited as the Dairy Industry Amendment Act, 1922, and shall be read together with and deemed part of the Dairy Industry Act, 1908 (hereinafter referred to as the principal Act).

2. Section two of the principal Act is hereby amended as follows: (*a.*) By inserting, after the definition of "conveyance," the following definition: "Cream" includes whey-cream. (*b.*) By omitting the definition of "dairy factory," and substituting the following: "'Dairy factory' means a cheese-factory, butter-factory, condensed-milk factory, milk-powder factory, or other factory engaged in the manufacture of dairy-produce, and includes a skimming-station, a buying or receiving station, or any other premises ancillary to a dairy factory."

Testing of Milk or Cream purchased for Manufacture.

3. (1.) Where milk or cream purchased for the manufacture of dairy-produce is to be paid for according to the percentage of butterfat contained therein, such percentage shall be determined by the Babcock, Gerber, or other prescribed test.

(2.) The test shall be carried out by the owner of the dairy factory purchasing the milk or cream, in such manner and at such times as are prescribed.

(3.) For the purposes of this Act milk or cream shall be deemed to be purchased by the owner of a dairy factory if it is received and accepted for the manufacture of dairy-produce at the factory.

Certified Statement of Overrun to be furnished to Suppliers.

4. (1.) Not later than two months after the close of each financial year every owner of a butter-factory or cheese-factory shall forward to each person from whom he has purchased milk or cream during that year a statement, certified as correct by an accountant registered under the New Zealand Society of Accountants Act, 1908, and not in the employ of such owner in any capacity other than that of auditor, showing for the year—(*a*) The weight of butter (correct to four places of decimals) made from each pound of butterfat used for the manufacture of butter; (*b*) the percentage which the weight of unsalted butter manufactured bears to the total weight of butter manufactured; (*c*) the weight of cheese (correct to two places of decimals) made from each pound of butterfat used for the manufacture of cheese.

(2.) In calculating for the purposes of the above-mentioned statement the weight of cheese manufactured at a dairy factory the weight as ascertained at the factory shall be taken as the correct weight: Provided that, in respect of that portion of the output of the factory which is exported, the factory weight shall be corrected by reference to check-weights (if any) supplied to the owner of the factory by a Grader under the principal Act in respect of each lot of cheese forwarded for grading prior to export.

(3.) The date of the close of the financial year of a dairy factory shall be determined in each year by the owner of the factory with reference to the close of the dairying season, but not later in any case than the thirty-first day of August in any year. The financial year shall be the period from the close of one financial year to the close of the next financial year.

Independent Investigation of Overrun Statement.

5. (1.) Within six months after the receipt of the statement referred to in the last preceding section any person from whom milk or cream has been purchased by the factory may make application in the prescribed manner to the Minister of Agriculture for an independent investigation into the correctness of the statement.

(2.) On receipt of such application, and on approved security being lodged by the applicant to cover the cost of the investigation, the Minister may, by writing, request the Audit Office to make an examination of the books and accounts of the factory, and to report as to the correctness or otherwise of the

particulars set out in the statement and as to the amount of error, if any, and the Audit Office shall so soon as practicable thereafter proceed to make such examination accordingly.

6. (1.) On the request of the Audit officer appointed to conduct the investigation it shall be the duty of the owner of the butter-factory or cheese-factory, and of all servants and agents of the owner, to produce for his examination all books and documents in their custody or control.

(2.) The Audit officer may examine on oath the owner of the factory, or any of his servants or agents, or any other persons, as to the business of the factory, and may administer such oath accordingly.

(3.) Every person who refuses to comply with any lawful request made by the Audit officer or to answer any lawful question put by him in the course of the investigation is liable for each offence to a fine of fifty pounds.

7. The cost of any such investigation shall be borne by the applicant for the investigation: Provided that if the investigation by the Audit Office discloses an error of more than one-half per centum in the particulars set out in the statement regarding the weight of butter or cheese made from each pound of butterfat the cost of the investigation shall be borne by the owner of the factory issuing the statement, and the fee of the Audit Office shall be recoverable from him as a debt due to the Crown.

Regulations.

8. The Governor-General may from time to time, by Order in Council, make regulations for all or any of the following purposes: (*a*) Regulating the sampling, testing, and weighing of milk or cream purchased by owners of dairy factories: (*b*) prescribing records to be kept or returns to be furnished by owners of dairy factories: (*c*) prescribing the powers and duties of Inspectors: (*d*) prescribing such other matters as are contemplated or desirable for giving full effect to this Act.

Export of Cheese deficient in Fats prohibited.

9. Section twenty-two of the principal Act, as amended by section two of the Dairy Industry Amendment Act, 1915, is hereby further amended by inserting, after paragraph (*d*) in subsection one, the following paragraph: "(*dd.*) Sends to any grading-store for the purpose of being graded any cheese of which the water-free substance consists of less than fifty per centum of fats wholly derived from milk, or exports or attempts to export any such cheese."

Interpretation of "Co-operative Dairy Company."

10. Section forty-eight of the principal Act is hereby amended by omitting from subsection one all words after the words "the principal object of which is," and substituting the words "the manufacture of butter, cheese, dried milk, casein, or other article from milk or cream supplied to the company by its shareholders, or the collection, treatment, and distribution for human consumption of milk or cream so supplied to the company."

GRADINGS OF BUTTER AND CHEESE.

THE following are the official gradings of butter and cheese for October, and for the three months August–October, 1922:—

Butter.—October, 173,613 cwt. (155,539 cwt. salted, 18,074 cwt. unsalted); increase compared with corresponding period of 1921, 59·56 per cent. Three months August–October, 325,609 cwt. (301,742 cwt. salted, 23,867 cwt. unsalted); increase compared with corresponding period of 1921, 75·23 per cent.

Cheese.—October, 61,991 cwt. (39,411 cwt. white, 22,580 cwt. coloured); decrease, 39·08 per cent. Three months August–October, 74,302 cwt. (47,477 cwt. white, 26,855 cwt. coloured); decrease, 47·53 per cent.

Butterfat-production.—Converting into butterfat equivalent the above quantities of butter and cheese graded during the three months August–October, 1922, there is shown to have been an increase of 43·10 per cent. in butterfat-production as compared with the corresponding period of the previous season.

THE SEASON'S LAMBING: NORTH ISLAND ESTIMATE.

FROM estimates furnished by the Inspectors of Stock in the various districts the average lambing for the current season in the North Island is estimated at 90·36 per cent. With 6,771,482 breeding-ewes in the North Island, as shown in the 1922 sheep returns, the number of lambs is estimated at 6,118,530. The corresponding figures for last year showed a lambing percentage of 89·65, and 6,312,456 breeding-ewes. South Island and Dominion estimates will appear in next month's issue.

ESTIMATED AREAS UNDER WHEAT AND OATS.

THE following estimates of the areas under wheat and oats in the Dominion for the current season have been issued by the Government Statistician, the figures being based on the usual card census: Wheat—North Island, 10,000 acres; South Island, 275,000 acres: total, 285,000 acres. Oats—North Island, 50,000 acres; South Island, 335,000 acres: total, 385,000 acres. The corresponding totals for the previous season (1921–22) were 355,390 acres of wheat and 532,304 acres of oats. In the current season's wheat-sowings the areas under the different varieties are given as follows: Tuscan or long-berry, 175,153 acres; Hunters (various), 56,641 acres; Velvet or Pearl, 31,172 acres; balance unspecified.

IMPORTATION OF FERTILIZERS: SEPTEMBER QUARTER.

FOLLOWING are the importations of fertilizers into New Zealand for the quarter ended 30th September, 1922: *Gypsum:* From Australia, 800 tons. *Nitrate of Soda:* Chile, 51 tons. *Basic Slag:* United Kingdom, 355 tons; Belgium, 2,120 tons; Luxemburg, 100 tons; Netherlands, 80 tons: total, 2,655 tons. *Bonedust:* India, 25 tons; Australia, 135 tons: total, 160 tons. *Guano and Rock Phosphate:* United Kingdom, 14 tons; Seychelles, 5,020 tons; New Caledonia, 1,660 tons; Nauru, 13,624 tons: total, 20,318 tons. *Kainit:* Belgium, 50 tons; France, 522 tons; Germany, 210 tons: total, 782 tons. *Sulphate of Potash:* United Kingdom, 50 tons; France, 77 tons; Germany, 10 tons: total, 137 tons. *Potash, other:* France, 35 tons; Germany, 100 tons: total, 135 tons. *Other Fertilizers:* United Kingdom, 2 tons; Australia, 1 ton; United States of America, 1 ton: total, 4 tons.

NEW ZEALAND INDUSTRIAL EXHIBITION, 1922.

THIS Exhibition opened at Christchurch on 18th November, and will run until 31st December. The promoters (the Industrial Corporation of New Zealand), being desirous that the primary industries should be represented as well as the secondary, have given a centrally situated space for that purpose, in which the Department of Agriculture is making a display of agricultural products. A glass-cased refrigerated chamber has also been provided by the Exhibition for the display of butter, cheese, &c., by the dairy industry. Farmers will thus find features of special interest to them at the Exhibition, apart from the fine show of New Zealand secondary products and other attractions.

Samples for Bacteriological Examination.—The attention of farmers and others is called to the absolute necessity of cleansing and sterilizing bottles before use for milk or blood samples forwarded to the Department's Wallaceville Laboratory for bacteriological examination. Some of the containers received lately have not even been washed, nor old medicine-labels, &c., removed. If senders expect careful observations to be made of their material they should at least ensure the despatch of the samples in decent condition.